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Electrical News

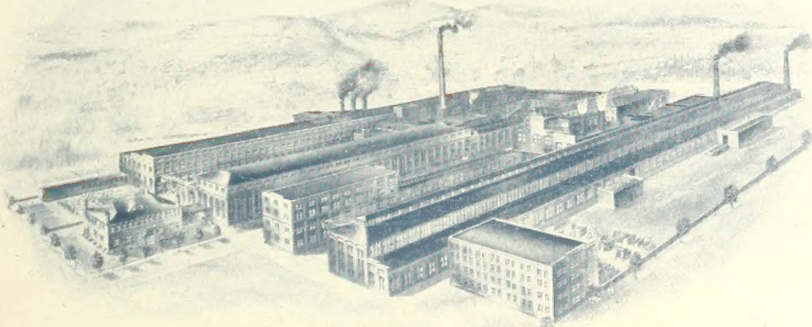
Engineering - Merchandising - Contracting - Transportation

FOR MORE THAN 40 YEARS

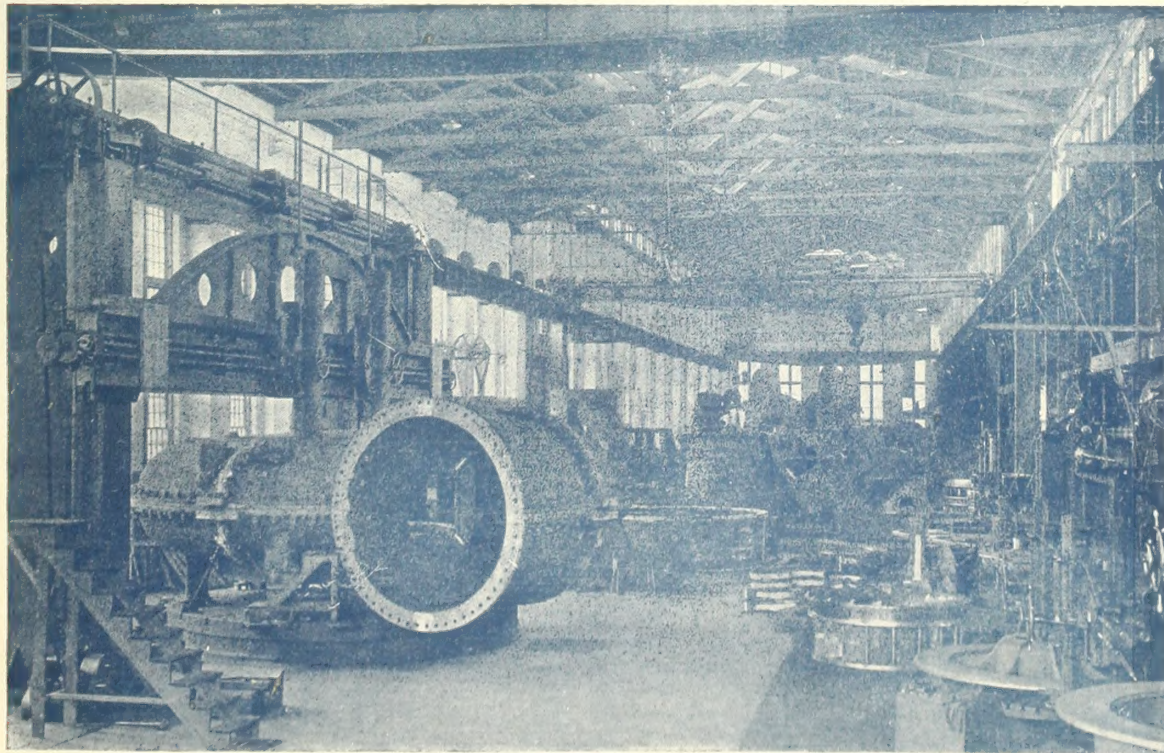
practically from the beginning of the Electrical Industry, the S. Morgan Smith Company has engaged in water power construction. In that time it has gradually evolved the largest and best equipped plant in the world devoted exclusively to the manufacture of water power equipment.

Back of the plant, and making it possible, is an Engineering and Research Department composed of specialists trained in designing, building, erecting and operating turbines.

Many Canadian projects bear our name.



View of Main Office and Factory, York, Pa.



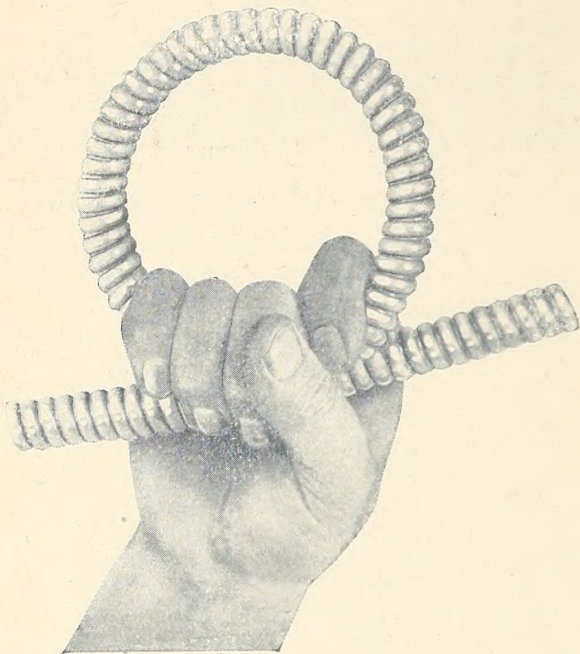
View of Boring Mill Department. The Mill in the foreground is the largest of its kind in the world. The weight of casting being machined thereon is 150,000 pounds.

S. MORGAN SMITH COMPANY, YORK, PA., U. S. A.
H. B. VAN EVERY, Representative, 405 Power Bldg., MONTREAL

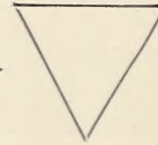
Canadian Triangle Conduit Co., Limited

Office and Works

TORONTO



QUALITY



SERVICE

ECONOMY

Products:

Flexible Steel Conduit
Flexible Steel Automobile
Tubing
Triduct (Non Metallic Flexible Conduit)
Armored Conductors

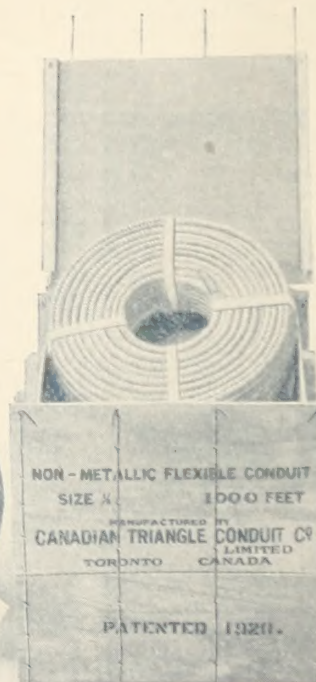
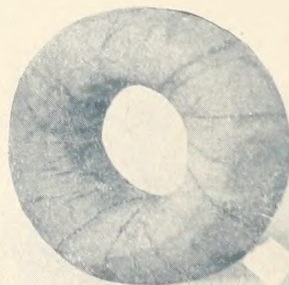
Flexible Steel Conduit

Note in the picture the flexibility of this product. It can be bent to a radius of $1\frac{1}{4}$ inches without injury.

As there is no springiness in this tubing, it can be installed with utmost ease.

Flexible steel conduits are produced with a single interlocking strip of cold rolled electro-galvanized steel. The outside diameter will not vary more than two one-thousandths of an inch in a million feet; this is due to our patented machinery.

Only the best grades of rubber-covered insulated wire are used in our Armored Conductors. Each length is thoroughly tested for conductivity, securely wrapped in burlap and tagged inside and out before leaving the factory.



**Exclusive
Sales
Agents:**

Our Products are Packed and Shipped as Quality Products Should be.

Conduits Company, Limited

33 Labatt Avenue

Toronto

Your Business Card

—What Does It Mean?

Your business card in itself is simply a piece of pasteboard with your name and business address printed on it.

Before it can represent your foresight, your responsibility and a *quality first* business policy your name must be linked up with a reputation for using *first quality* materials.

The Benjamin-Starrett Panel Cut-Out is material of this class. The illustration shows you at first glance that this Cut-Out is a one-piece device; that its installation will save time and labor over the building up of a many piece porcelain block job.

You see here no dangerous, unsightly, exposed wires. The wires carrying the main current are out of sight and safely out of reach.

Compare from all standpoints ten Benjamin-Starrett Panel Cut-Out installations with an equal number of built-up-on-the-job porcelain block cut-outs. You will then understand what we mean when we talk about saving time and labor. The net result of the Panel Cut-Out installations will be ten better jobs and more profit.

The complete Benjamin-Starrett Panel Cut-Out installation consists of a Benjamin Starrett Panel Cut-Out in 4, 6, 8 or 10 circuits — with any standard knife switch mounted in a standard cut-out box, or in a box by itself with any of the new types of safety switches installed right beside it, or where most convenient.

The Benjamin-Starrett Panel Cut-Out is a constant visible evidence of your judgment and your idea of what service to your customer means.

The biggest profits follow the best work.

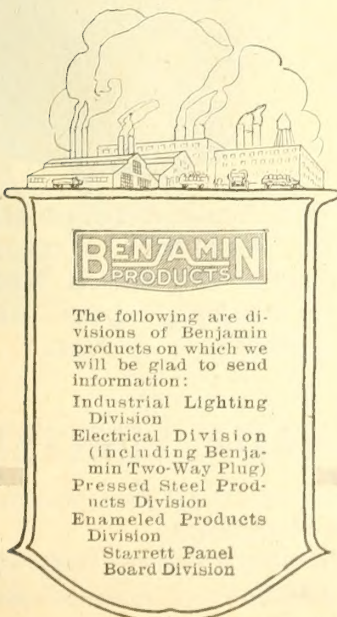
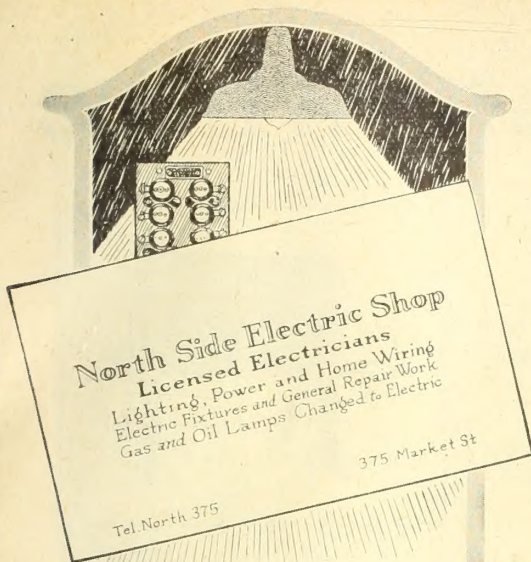
Address your enquiries to Advertising Department
11-17 Charlotte Street, Toronto

Benjamin Electric Mfg. Co.
of Canada, Limited

MONTREAL TORONTO WINNIPEG

BENJAMIN

Makers of Things More Useful



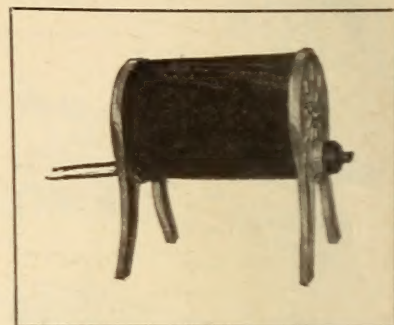
Install Them Anywhere

In cold weather Superior Air Heaters are invaluable for: Sub-stations, Power Houses, Garages, Institutions, Offices, Show Windows, Ticket Booths, Outdoor Sleeping Porches, Chicken Houses, in fact any sort of enclosure where electrical heat can be used.

All Standard Voltages. Standard sizes 1300, 2000, 2500, and 3000 watts.

Larger sizes built to order.

Supplied with single or three heat indicating switches, also without switches.



Portable or stationary types. Stationary types may be bolted to the floor, wall or ceiling as desired. Nickel plated finish, raised portions polished. Very handsome in appearance, approved by Hydro Electric Power Commission, Approval No. 136.

Manufactured by

Superior Electrics Limited

Pembroke

Ontario

Moloney Pipe Thawing Transformer

Don't wait until the cold weather is upon you; consider your requirements and order now.

Don't let the severe weather catch you unprepared, freezing up your pipes and causing you heavy expense.



We have a large stock of Service Transformers on hand ready to supply you at a moment's notice.

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, Confederation Life Bldg., Winnipeg.

District Offices

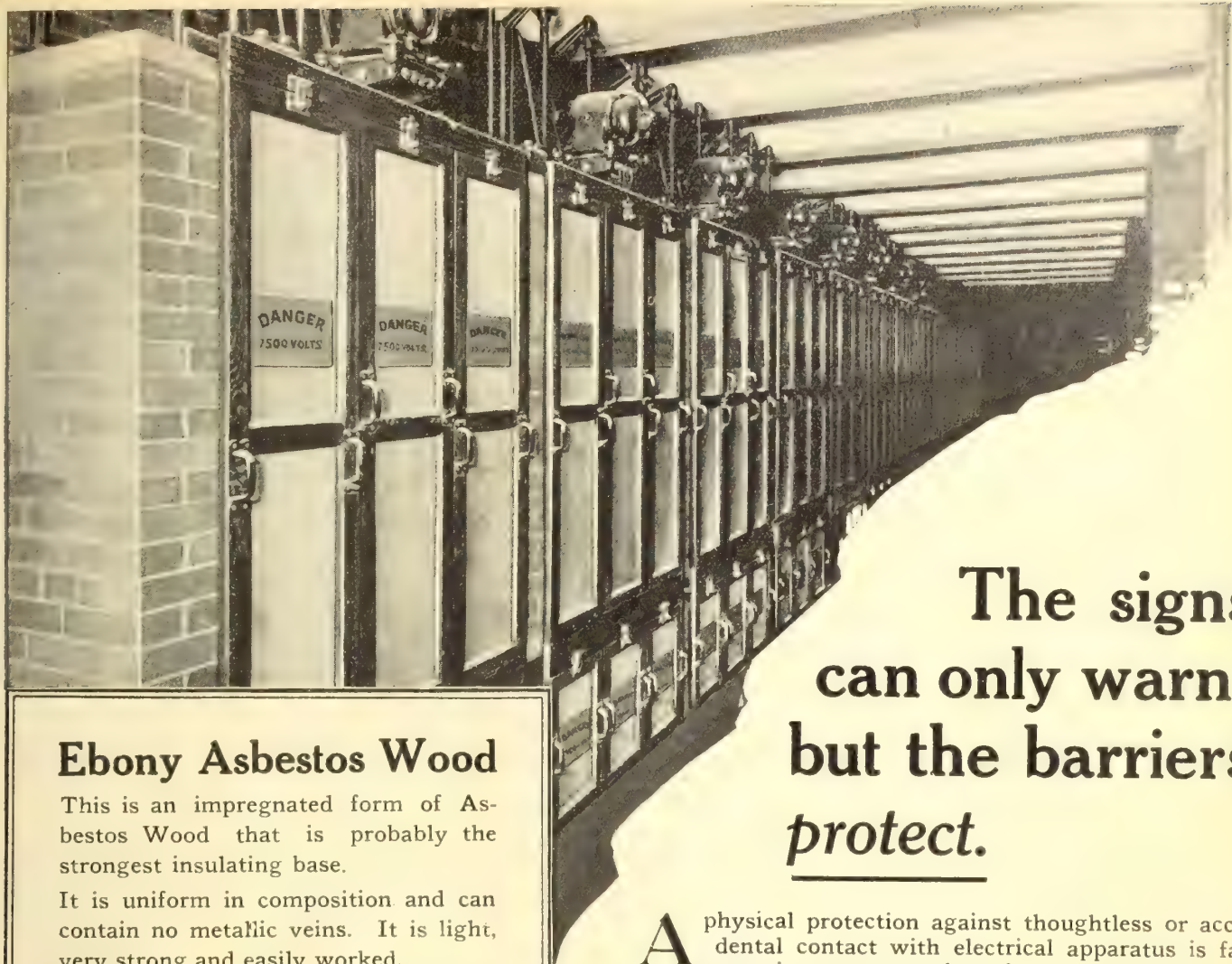
Factory

Head Sales Office

Montreal and Halifax

Windsor, Ont.

1221-2 Bank of Hamilton Bldg., Toronto



The signs
can only warn-
but the barriers
protect.

Ebony Asbestos Wood

This is an impregnated form of Asbestos Wood that is probably the strongest insulating base.

It is uniform in composition and can contain no metallic veins. It is light, very strong and easily worked.

Ebony Asbestos Wood far surpasses ordinary switchboard material in dielectric strength and equals the best oiled slate in appearance.

Send for a sample to test.

A physical protection against thoughtless or accidental contact with electrical apparatus is far superior to any number of warning signs.

This is the one big reason why electrical barriers are used increasingly in station construction. And the necessity for barriers which can cause no hazard through deterioration or structural weakness makes Johns-Manville Transite Asbestos Wood most desirable for this purpose.

For Transite Asbestos Wood is a material of great physical strength and high dielectric strength, it is not liable to warp or crack and it is light and easily worked.

Even if you do believe in signs, you need barriers of Transite Asbestos Wood to protect.

Canadian Johns-Manville Co. Limited

TORONTO MONTREAL WINNIPEG VANCOUVER
LONDON HAMILTON OTTAWA WINDSOR



Through—

Asbestos

and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High
Temperature Cements,
Asbestos Roofings,
Packings, Brake
Linings, Fire
Prevention
Products

JOHNS-MANVILLE ELECTRICAL MATERIALS

**When You Want Service
ORDER**



Electrical Merchandise

DISTRIBUTORS OF

Benjamin	Eveready
Banfield	Hubbell
Boston Insulated	Jefferson Glass
Crouse Hinds	Square D
Duncan	Westinghouse

and other good Canadian Products.

The Masco Company, Ltd.
78 RICHMOND STREET EAST, TORONTO

Aluminum Conductors

—Steel Reinforced

Aluminum cable with a core of steel realizes on the lightness and conductivity of the aluminum and the extra high strength of the steel.

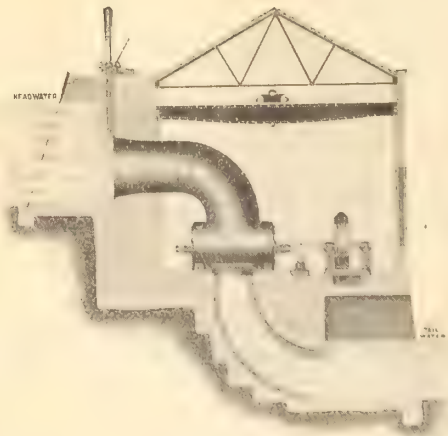
Due to the increased strength and decreased weight, span lengths for transmission lines may be increased with a reduction in line costs. Usually a notable saving in poles or towers and insulators is effected.

Electrical Conductor Handbook — new edition — will be ready soon. Send us your address and we will reserve a copy for you.

Northern Aluminum Company
1307 Bank of Hamilton Bldg. *Limited*
Toronto, Ontario

Hydraulic Turbines

Why Not Buy Them in Canada?



“Hamilton” Turbines are built in a range of sizes and types, to meet all requirements.

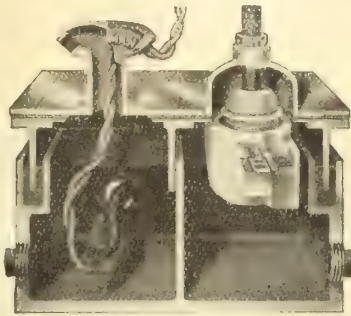
*Send for Our Bulletin
No. 54*

Made in Canada

Wm. Hamilton Co., Limited
PETERBOROUGH, ONTARIO

Fullman Floor Outlets

Two to Six Sections
ADJUSTABLE COVERS



There is no floor outlet job that the Fullman will not do, better and more economically.

Write for Complete Catalogue.

STEEL CITY ELECTRIC COMPANY
PITTSBURGH, PA.



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

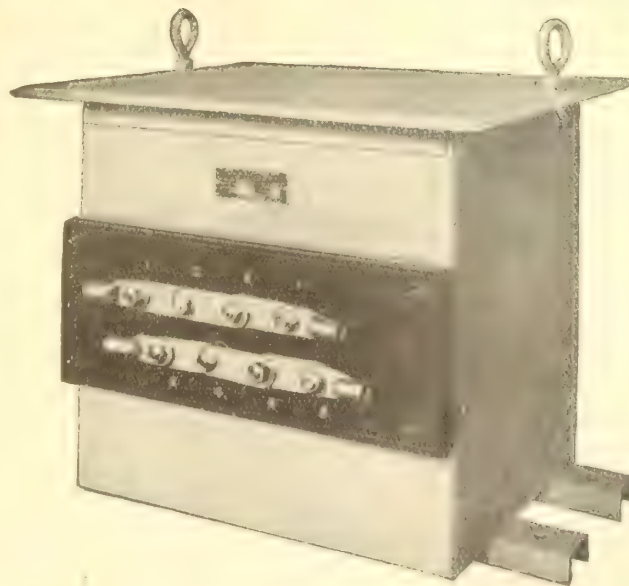
PIPE THAWING TRANSFORMER

The use of Electric Current for thawing frozen water pipes has been practically demonstrated during the last few years to be a reliable and economical means of solving one of the troubles caused by a severe winter.

These transformers are of the air cooled type, and are enclosed in sheet steel tanks.

Channel Irons are fitted to the bottom to facilitate moving.

The Connection Board is so designed that by



moving the links, the desired voltage can be obtained.

They are ruggedly designed, and will withstand the ordinary kicks which may be experienced in their use.

Made in sizes of 10 to 50 K.V.A., 2200 volts to 110/55/27½, for 60 or 25 cycles.

Order now. Do not wait until your water pipes freeze up. Write us for further information. They will pay for themselves in one winter.

Ferranti Meter & Transformer Mfg. Co. Ltd.

FACTORY
28 Noble St.
TORONTO

128 Bleury St.
MONTREAL.
Northern Ontario
J. P. Bartleman
Timmins

3 Victoria Rd.
HALIFAX
B. C. Rep.
W. H. Hazlett & Co.
Vancouver

145 Market Ave.
WINNIPEG

Two New Type Standard Panels for Power and Light Installations

Our New Dead Front Lighting & Power Panel

This Panel contains Thirty-eight Benjamin Knife Switches from 30 Amperes to 200 Amperes all 250 Volts.

Cabinet containing switches is 78 inches High, 78 inches Wide, 12 inches Deep, with Magazine Panel attached 72 inches High, 34 inches Wide, 4 inches Deep, containing Sixty-six distribution Cutout Blocks for 132 Circuits 2-2 Wire.

We designed this particular panel for the Canada Electric Co., to use in the Allen's Palace Theatre, Montreal, primarily to place in operation a Theatre Switchboard with all of the most modern and up-to-date improvements including entire dead front feature, ease of operation, replacement and enlargement possible with the least outlay and delay, everything placed just where wanted and in exact relation to position of dimmer banks, which are to be placed directly above same.

The master switches for White, Blue and Red in Auditorium, master switches for White, Blue and Red for Back-stage, are placed in the same relative position that they occur at the dimmer bank, making the board one even a novice could operate without any trouble.

Owing to the limited space in which we were compelled to work there was no room for the usual magazine panel back of the switchboard and by careful design and co-operation with the Architect the magazine panel was placed at the side of the main board.

This construction has been found to be very advantageous in many respects, viz. the replacement from stock at the factory of any switch with the minimum of expense and delay, the possibility of enlargement even after the board has been completed, all switches are of extra heavy design being 100% over normal design to meet the severe constant usage.

The construction of the operating handle is of such rigid design that it is possible to use both hands and feet in the rapid operation of switches and dimmers.

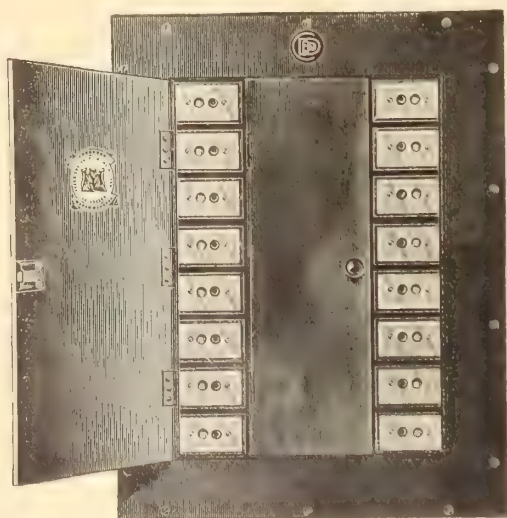
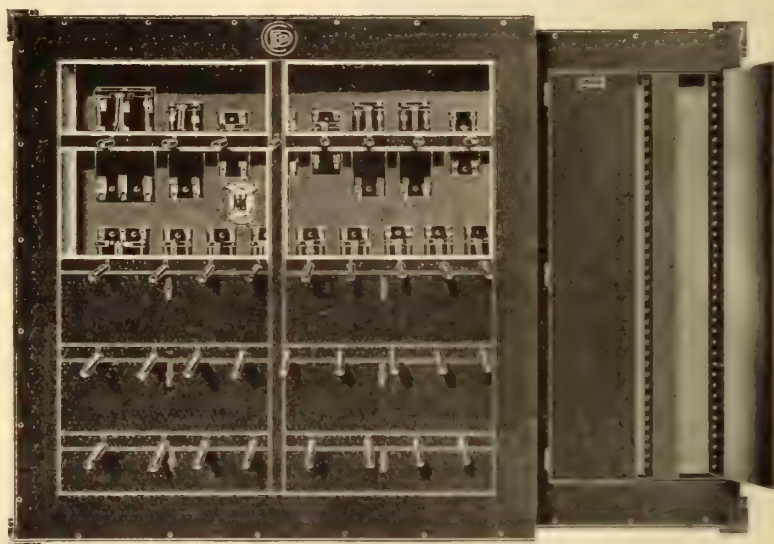
The design has been such that there are no unsightly wires, conduits, or other structural features to mar the neat and compact appearance.

Our New Standard Dead Front Panel

We designed the above panel to meet the needs of a moderate priced standard panel which would meet all requirements where such panels are called for, and also standardized on a type that would readily adapt itself to the various conditions on the job.

The sections which go to make up the fuse protective section are interchangeable and easily procurable from all standard dealers, the switch portion is made up in such a manner that the fuses protect the switch as well as the circuit control, so that there is no heavy amperage directly connected to the branch switches.

The panel is made interchangeable either 3-2 wire or 2-2 wire to meet local conditions, and can be supplied with or without inner door covering the dead-front cutouts, the inner door makes this panel fool-proof and absolutely safe for any parties, no matter how inexperienced, to operate with positive satisfaction.



Canadian Drill & Electric Box Co., Limited
1402 Queen Street East, TORONTO, ONT.

It Pays to Sell The Hoover

Ask Hoover dealers if it pays to sell The Hoover. They will tell you how many Hoovers their stores have sold the past year—and you will be agreeably surprised.

They will tell you how easy it has been to sell Hoovers although many never sold electric cleaners before; how receptive the people are when The Hoover is mentioned; how it is the best advertised, best known, most called for cleaner in Canada.

They will tell you how our men keep in constant touch with them; how they help them turn over their stocks; how ample is the advertising material we furnish them.

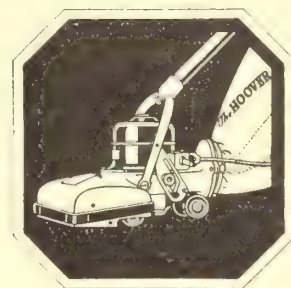
They will tell you what satisfied users Hoover purchasers become; how users suggest friends as prospects; how free from trouble their Hoover business is conducted.

Lastly, they will tell you of the large profits they have made on small investments.

Ask Hoover dealers if it pays to sell The Hoover. Let their statements guide you in your verdict.

THE HOOVER SUCTION SWEEPER COMPANY
OF CANADA, LIMITED

The oldest and largest makers of electric cleaners
Factory and General Offices: Hamilton, Ontario



Ever increasing production of Hoovers in Canada is enabling us constantly to add new dealers. We have a very attractive proposition to present. No obligation is attached to your inquiry

The HOOVER

It Beats . . .

as it Sweeps

as it Cleans

Made in Canada by Canadians for Canadians

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Rubber Covered Wires and Cables

FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

GALVADUCT



A Galvaduct Building—
American Can Company, Limited, Plant, Montreal, Que.
Anglin-Norcross Company, Limited, General Contractors.

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you—write us.

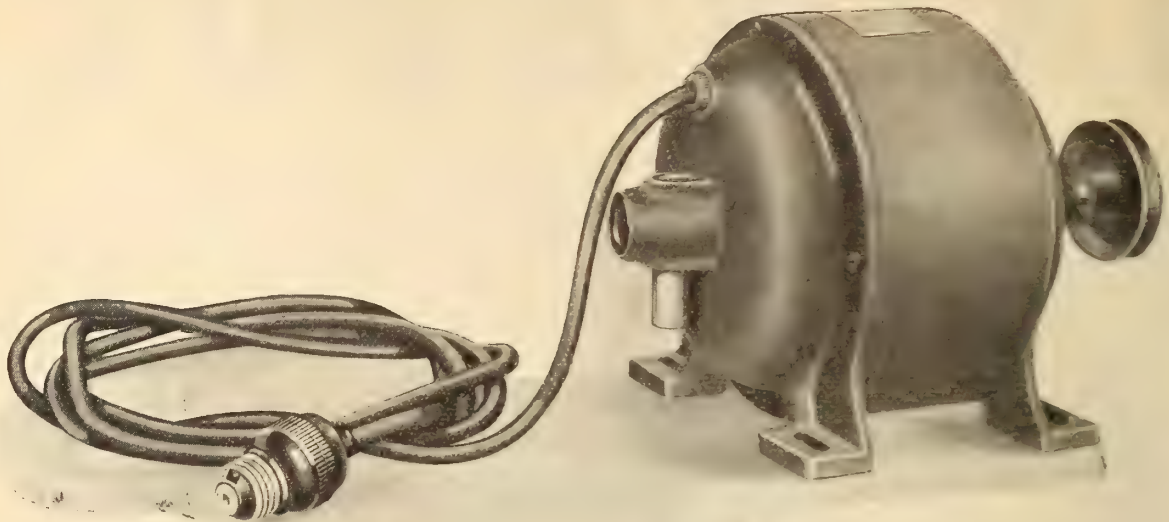
Conduits Company Limited

Toronto

Montreal

Western Sales Office: 602 Avenue Building, Winnipeg

LORICATED



*Canadian Crocker-Wheeler $\frac{1}{4}$ h.p., 110 volts, 60 or 25 cycles,
totally enclosed motor*

“Totally Enclosed”

Comparatively a new comer in the fractional horse power motor field, this Canadian Crocker Wheeler product has already proven its superiority in actual use. The motor is TOTALLY ENCLOSED making it both water proof and dust proof. As in larger motors, we use the well known and approved Canadian Crocker Wheeler “cast winding” construction for the Rotor which makes for longer life and absence of trouble. Has a high starting torque. Big considerations these for washing machine and other household uses.

Canadian Crocker-Wheeler apparatus and service are available at all of the branches of the N. E. Co. at:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

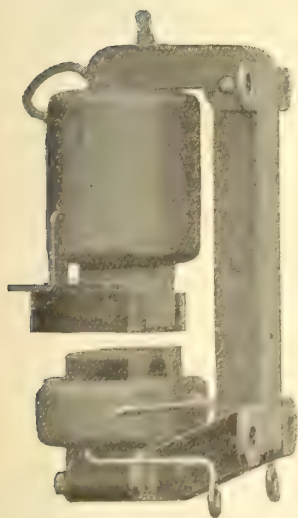
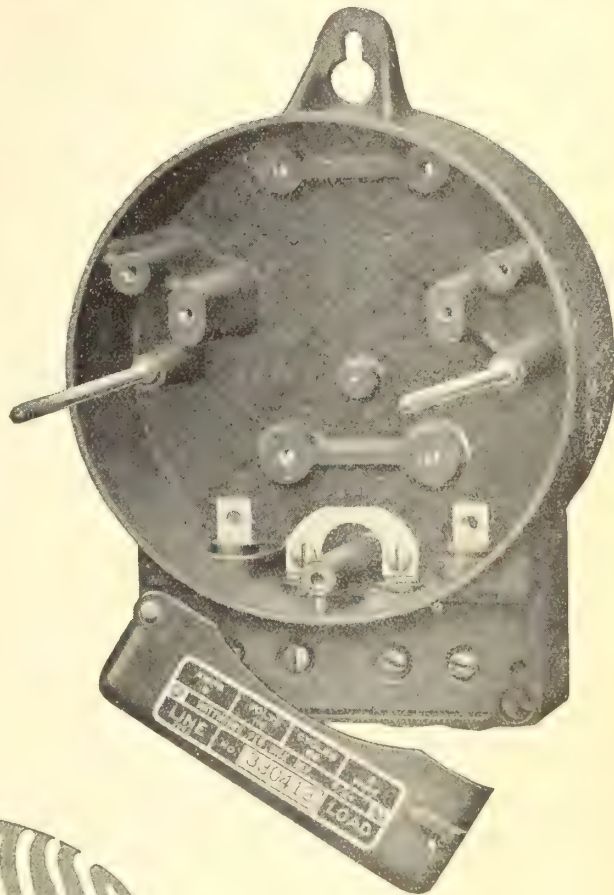
Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL

Easy Replacement of Sangamo Meter Parts

WHEN repairs are necessary it is a simple job to make replacements of parts in Sangamo Type "H" Meters. No matter whether it is a potential coil, moving element or jewels to be replaced after long service wear, the work can be done accurately in the shop or on the line. And you can do it with the assurance that you are putting your meter together right, for there is only one way parts will fit. Furthermore you can make replacements of potential and series coils, moving element, jewels, etc., without seriously disturbing calibration.



Shunt and Series
Magnets

All parts are easily accessible. They are interchangeable with those of any other Sangamo meter of similar voltage and frequency.

Ease and accuracy of assembling are only two of many superior features embodied in Sangamo meter design.

Let our nearest agent give you more interesting details on Sangamo Type "H" Meters. Write today for Bulletin 4618.

Sangamo Electric Company of Canada, Limited

Factory: TORONTO

Head Sales Office: MONTREAL



A comprehensive retail sales plan, of which the window display is only one unit, has been created to assist Crystal dealers in turning to immediate advantage the established superiority of the Crystal machine. Dealers of sufficiently high standing should write for specific information regarding the Crystal franchise.

CRYSTAL DIVISION MALLORY INDUSTRIES, Inc., *Detroit*
Factories: DETROIT, MICH., PORT CHESTER, N. Y., BALTIMORE, MD.
Canadian Distributors: ONWARD MANUFACTURING CO., KITCHENER, ONT.

CRY

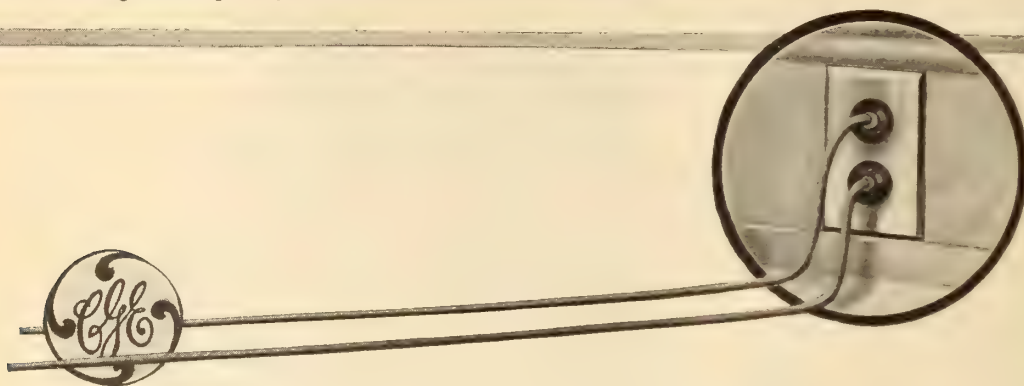
Electric Washer



Richly lithographed in full colors, the artistic display cards and the life size figure command instant attention and concentrate it on the machine. The window draperies which form a part of the display were omitted to facilitate reproduction.

Crystal and Wringer

To appreciate the full convenience of Electricity, it is essential to have plenty of suitable outlets.



Added Convenience

An Electrical installation is not complete, or even adequate, unless provision is made for connecting portables such as:

Electric Fans

Heating Devices

Desk or Table Lamps

Small Motor Driven Appliances, etc.

Plenty of C. G. E. Baseboard and Wall receptacles are necessary for convenience, and prove an economy in the long run.



Canadian General Electric Co. Limited

Head Office - Toronto

Branch Offices:---Montreal Quebec Sherbrooke Halifax Sydney St. John Ottawa Hamilton London
Windsor Cobalt South Porcupine Winnipeg Calgary Edmonton Nelson Vancouver Victoria

Announcement

CANADIAN LACO LAMPS,
Limited
TORONTO, ONT., and
MONTREAL, QUE.

**CANADIAN TUNGSTEN LAMP
COMPANY, Limited**
HAMILTON, ONT.

**CANADIAN WESTINGHOUSE
COMPANY, Limited**
HAMILTON, ONT.

WE desire to announce that the Canadian Tungsten Lamp Company, Limited, of Hamilton, the Canadian Laco Lamps, Limited of Toronto and Montreal, and the Canadian Westinghouse Company, Limited, of Hamilton, have been granted licenses to manufacture and sell drawn wire tungsten filament incandescent lamps and gas filled incandescent lamps under patents owned by the Canadian General Electric Company, Limited. Any other manufacturers of tungsten filament incandescent lamps or gas filled incandescent lamps in Canada are infringers of the patents of the Canadian General Electric Company, Limited.

Among these patents are the following:—

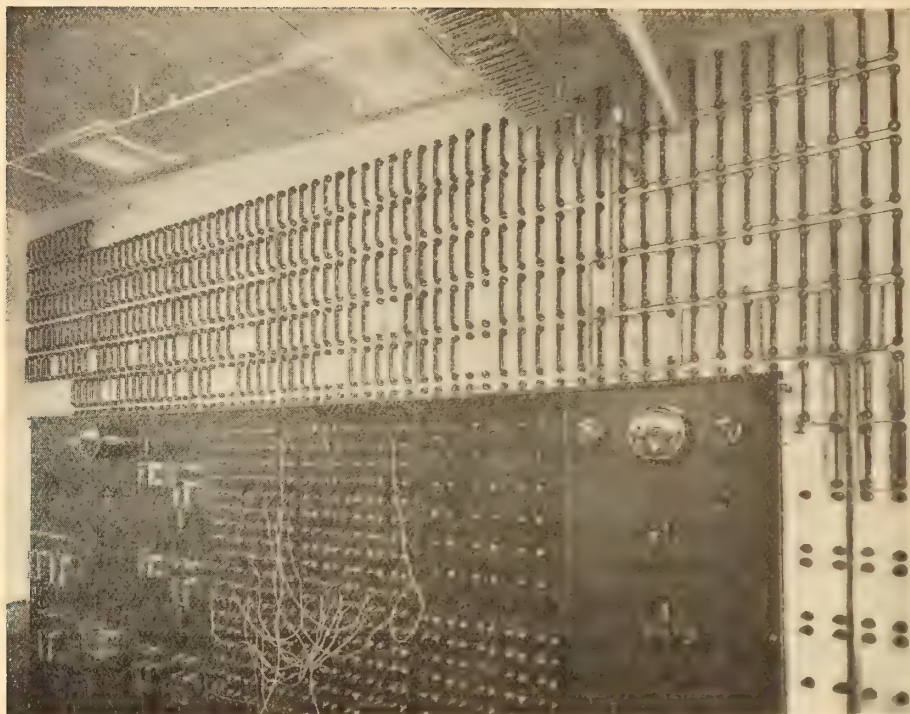
Numbers—140,301; 140,302; 140,303; 140,350; 140,351; 140,352; 142,703; 152,924; 155,290; 156,373; 159,743; 162,445; 162,446; 162,570; 162,693; 164,828; 166,120; 166,121; 166,536; 167,329; 169,276; 169,936; 174,211; 176,010; 176,742; 177,227; 177,881; 179,117; 182,732; 185,854; 185,855; 186,072; 188,091; 188,141; 189,568; 190,194; 192,792; 197,329; 197,330; 198,329.

In the maintenance of its property rights it is the duty of the Canadian General Electric Company, Limited, to see that its patents are respected. Therefore, notice is given to manufacturers, purchasers or users, of infringing tungsten filament incandescent lamps or gas filled incandescent lamps that they will be held liable to the Canadian General Electric Company, Limited, on account of such infringement.

Canadian General Electric Co., Limited

Head Office: - TORONTO

Branch Offices: MONTREAL, QUEBEC, SHERBROOKE, HALIFAX, SYDNEY, ST. JOHN, OTTAWA, HAMILTON, LONDON, WINDSOR, COBALT, SOUTH PORCUPINE, WINNIPEG, CALGARY, EDMONTON, NELSON, VANCOUVER and VICTORIA.



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← Ward
← Leonard
← Resistor
← Units
← in Fuse
← Clip
← Mountings
← which are
← connected
← to Plug
← Switch
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calls for Standards that are unchangeable by extremes of heat, cold or by time.

Manufacturers of Electrical Wiring Devices, as well as others, must have such standards—that's why the Bryant Electric Company, Bridgeport, Conn., uses

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in its Laboratory. They are enabled to test the performance of their output accurately and definitely, because

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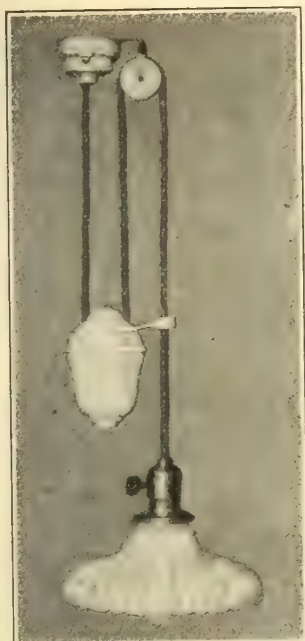
Vitrohm insures permanent resistance, permanent ohmic value, standards.

Every electrical man has Resistance problems, either in connection with plant operation or his product. Ward Leonard Resistance specialists will gladly help solve them. Avail yourself of their experience. Any resistance from 0.1 to 100,000 ohms in a smaller space than can be ob-

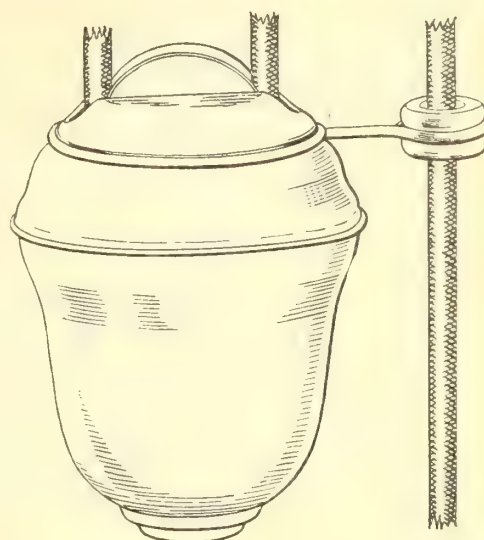
tained in any other construction. Do you want a free sample?

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Made from the best of material and packed in individual boxes, finished White Enamel, hydro approval number.

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Krantz Safety Panel Boards afford the ideal installation for apartment houses, schools, office buildings, factories and homes—ideal because of their simplicity, safety and appearance—so simple a child can operate them—so safe it is impossible to receive a shock from them—so smart in appearance they can be installed anywhere.

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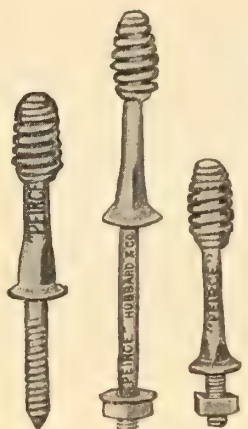
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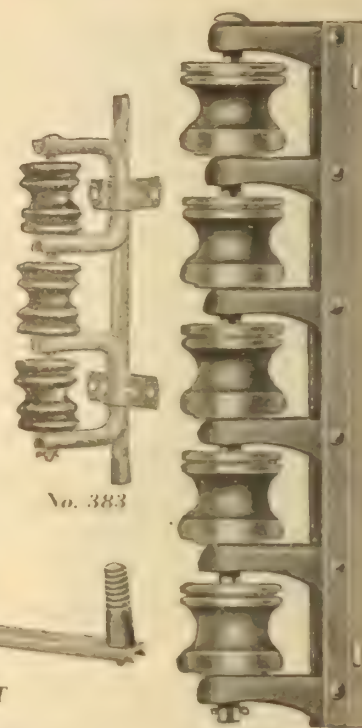
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We wish to advise our customers that until further notice we shall continue to accept Canadian funds at par, investing the same in Canadian securities.

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Oshkosh Construction Tools

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HIGH TENSION EQUIPMENT



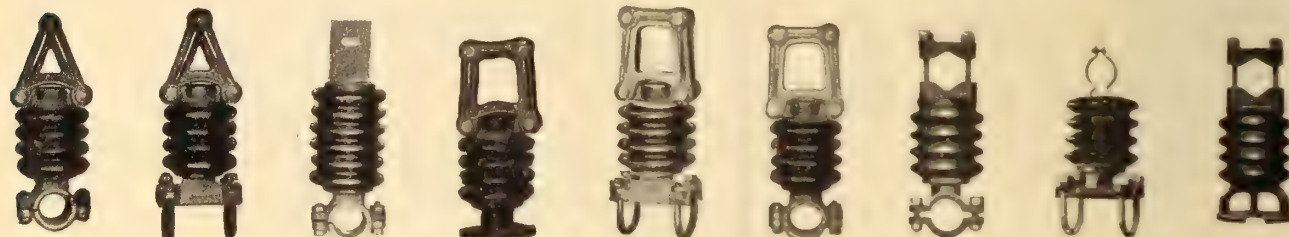
Has This Been Your Experience?

A power company in a moderate sized city built a new plant which their engineers thought would be of ample capacity to take care of their load for many years to come. But, as usual, the unexpected happened.

Oil was discovered in the territory.

The city and vicinity increased in population at a rate which staggered the older residents and kept the power company's engineers hustling. As the load grew, extensions to the plant followed one another rapidly. Outlying sub-stations were built and transmission lines reached out and gathered in the oil field load.

Naturally, with the growth of the system, many necessary changes were made in equipment. Busses had to be increased in size and rearranged. Before long it became advisable to raise the operating voltage, in order to feed the growing city sub-stations economically.



Unit type bus supports are furnished with interchangeable fittings at both ends. A change in type or size of busses, or method of mounting, means only the work of unscrewing one fitting and screwing on another, placing the original fitting in stock where it is available for use elsewhere.

Increases in voltage are easily taken care of by simply increasing the length of porcelain—screwing two parts together.



In a few years the main storeroom of the company resembled a robber's warehouse. Discarded bus supports of all shapes and sizes filled the place. Even if their second hand value had amounted to anything, the ever-present possibility of trouble made it very desirable to keep on hand spare units of every type in use.

The contents of that storeroom represented a sum which would have been more appreciated by stockholders in the form of dividends on common stock.

Such a state of affairs is no longer necessary. The development of the unit type bus support makes it possible to quickly and economically change old equipment to meet new conditions and to reduce stocks of spare units to a minimum.

Another important factor is, that these same insulator units are interchangeable with those on disconnecting switches and all other indoor equipment.

Store room stocks can be reduced to a few spare insulators, any of which are available for instant use in any station on the system.

Thus Unittype bus supports are always worth 100% of their original cost—the depreciation is practically nothing.

Profit by the experience of others and on your next installation use bus supports which will be suitable for future as well as for present requirements

Write for Bulletin No. 31

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REPRESENTED IN CANADA BY

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents: Frank Darling & Co., Ltd. Vancouver General Supplies Ltd., Calgary F. H. Girdlestone, Confederation Life Bldg., Winnipeg

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Head Sales Office

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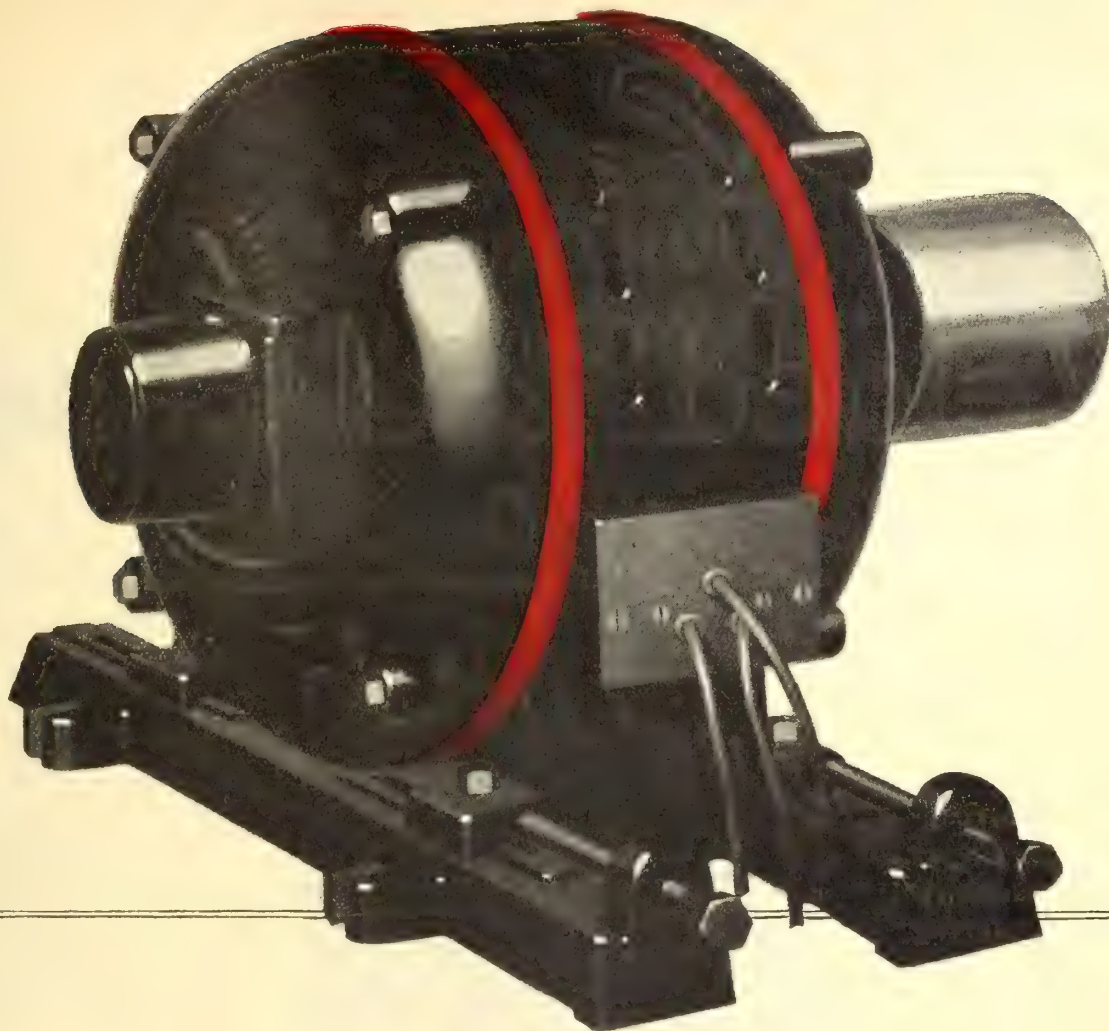
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DELTA-STAR HIGH TENSION EQUIPMENT

UNIT-TYPE INTERCHANGEABLE PARTS





Built to Keep Everlastingly on the Job --- and Serve with Freedom from Repairs

Because it is so built that the common defects and weaknesses in polyphase motors have been eliminated, the Howell Red Band Motor has an established reputation for trustworthiness.

With enameled wire—double cotton covered—superslot insulation, patented re-centering bronze bearings, indestructible rotor and conservative temperature ratings, Howell Red Band Motor design and construction assure long-continued service.

It is built to keep everlasting on the job.

The Howell Red Band Motor has ample ventilating ducts, which permit free circulation of air, yet are so designed that they do not become clogged with accumulations of foreign matter, which if allowed to remain in the air ducts, cause the motor to become extremely hot in service.

A trap in the oil reservoir of the Howell Red Band Motor obstructs any movement of oil-laden air from the bearing housing toward the rotor and prevents bearing troubles caused by drainage of oil from the reservoir.

It is because of the many superiorities in Howell design that in American industries everywhere implicit faith is placed in the ability of the Howell Red Band Motor to give never-faltering service.

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Electric Motor & Machinery Company, Ltd.
417 St. James Street

Howell RED BAND ELECTRIC Motors

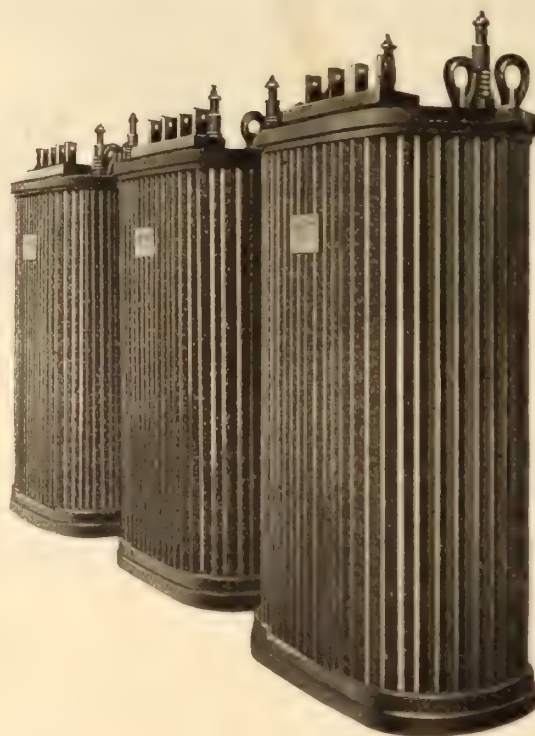
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TRANSFORMERS

Welded Steel Cases

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Foresight in arranging for ample supply of all necessary materials entering into the manufacture of Transformers enables us to make prompt shipments of all standard sizes from stock.



Short delivery dates on Special Units.

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Steel Bottom Welded to Corrugations — Cannot Leak
Other Exclusive Features in Mechanical and Electrical Design

Others may follow but we lead

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Can We Help You ?

There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

INFORMATION WANTED

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347 Adelaide St. West,
TORONTO.

Date.....19

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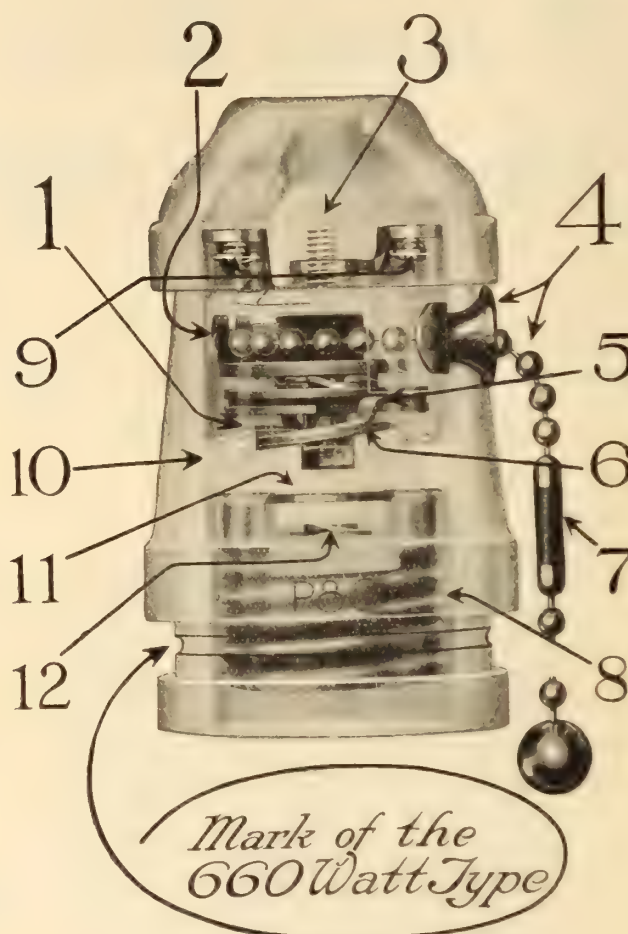
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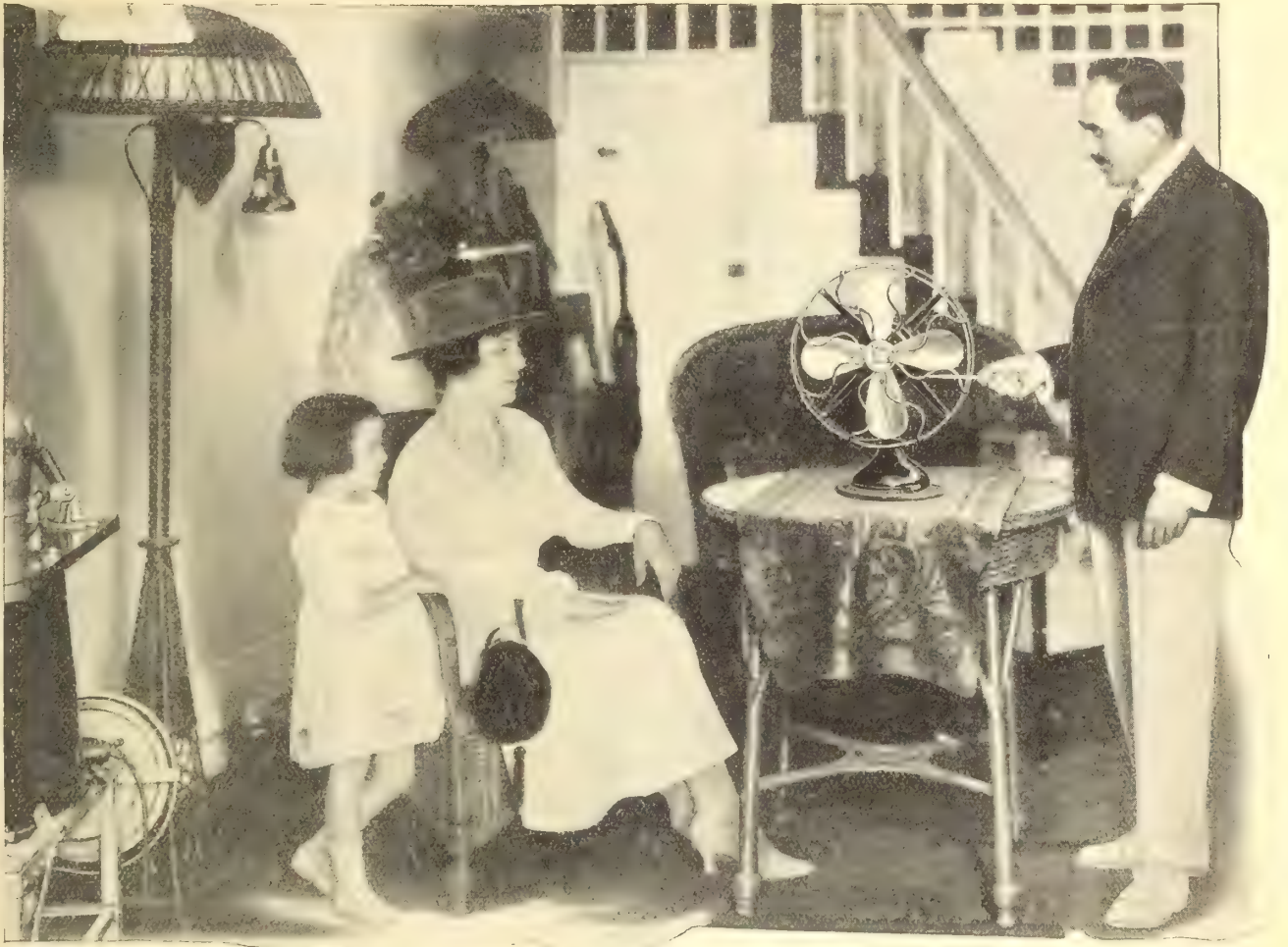
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The Test of Porcelain Pull Sockets



- 1—Make and Break the full load—and when called upon carry an excess load—with positive safety.
 - 2—Built rugged to stand the Constant Pull—and Exceptional Jerk on the chain.
 - 3—All Caps and Bases fit all Bodies—the Original Idea of Interchangeability.
 - 4—Take out the Chain and Bell Mouth with the fingers—it must be easy.
 - 5—Rotating Spider must make positive connection on both sides—and break it with a snap.
 - 6—Twin Spiral Ramps of Phosphor Bronze must not corrode.
 - 7—Additional Safety Insulator—extra precaution.
 - 8—Strength and Conductivity are essential—hence the Oroide Lamp Shell.
 - 9—Must be easy to wire—big screws and heavy plates.
 - 10—P & S Porcelain is the Highest Standard of Quality.
 - 11—Horse-shoe Reinforced Lamp Shell—it must be rigid.
 - 12—Spring Center Contact must make constant contact on the Lamp to prevent arcing.
- More than this you do not need—Less than this you cannot accept.
Backed by the Prestige of Thirty Years of Continuous Manufacture.

PASS & SEYMOUR, Inc. - Solvay, N.Y., U.S.A.
MAKERS OF STANDARD ELECTRIC WIRING DEVICES



Beauty

IN the beautiful design and finish of the Robbins & Myers Fan the dealer has a talking point which appeals to every prospective customer.

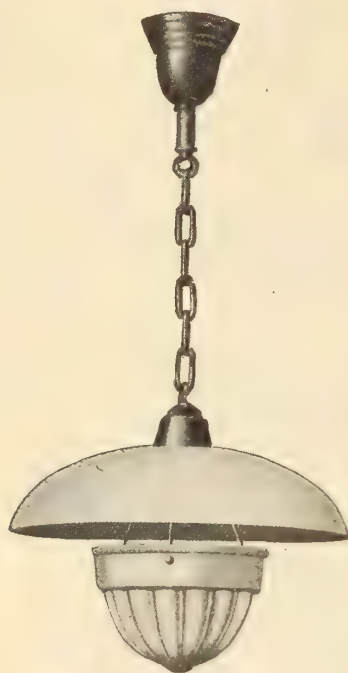
The perfectly smooth surface of the gracefully formed drawn steel frame and base takes a flawless enamel finish which is as attractive as it is durable. The polished brass blades, the felt

covered base—every detail in fact, is such as to make the R & M Fan stand out as a quality article. It is a high grade, reliable article which looks the part from every angle.

Dealers find that this fine appearance of the R & M Fan always impresses customers favorably and helps wonderfully in making the sale.

The Robbins & Myers Company of Canada
LIMITED
Brantford, Ontario

Robbins & Myers Fans



The "Dominionlite," a Nitrogen Unit composed of "Lumo" glass throughout—all metal parts are finished in Brushed Brass.

Quotations on special finishes on request.

Wins Favour By Service

Since the "Dominionlite" has been put on the market, it has grown in popularity, in a most remarkable manner.

By actual tested service it has proven its many advantages.

A patented feature of "Dominionlite" is the method of raising and lowering the position of the lamp in the lower bowl. This is done by sliding the upper shade holder on the nipple to which the socket is attached and is held by a set screw. By this means the lamp filament can be held at a point where the lower bowl will not throw a shadow on the upper reflector, nor will the direct light rays from the lamp shine out between the two shades to throw a direct ring of light.

See our display of "Dominionlite," and other units at nearest showrooms.

Jefferson Glass Company, Limited

Down-town Showrooms: 164 Bay Street, Toronto
Factory and Office:
388 CARLAW AVE., TORONTO

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Winnipeg, 272 Main Street
Vancouver, 510 Hastings St. W.



For nearly thirty years the recognized journal for the
Electrical Interests of Canada.

Published Semi-Monthly By

HUGH C. MACLEAN, LIMITED

THOMAS S. YOUNG, Managing Director

W. R. CARR, Ph.D., Editor

HEAD OFFICE - 347 Adelaide Street West, TORONTO
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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, January 1, 1921

No. 1

Only Way to Explain the Luxury Tax was to Abolish It

The whole electrical industry heaves a sigh of relief at the announcement that the collection of luxury taxes has been cancelled by the Dominion Government. Whatever its effect may have been on the volume of purchase by the general public there can be no possible doubt in anyone's mind but that it entailed a tremendous amount of work, worry and expense for the retailer. Not the least of the objections to this tax was the different interpretations put upon the regulations by different retailers, no two of whom, however honestly desirous they may have been of meeting the wishes of the Government, have collected the tax in the same way.

Electrical dealers are now entirely absolved from any responsibility whatever in the matter of collecting taxes.

The sales tax collected from manufacturers, wholesalers and importers remains in force.

Misleading Report that Does Not Apply to Canada at All

"Contracts worth £200,000 have recently gone to a German firm of electrical machinery manufacturers because their prices were so much lower than those of their English rivals."

The above item appeared in a Toronto evening paper and, though probably unintentionally, it gives the impression that this refers to a Canadian purchase. As a matter of fact, it is taken from an English paper and has reference to equipment bought there. This is bad enough, as it is a bad example for the mother country to be setting her children, but presumably they know their own business best over there. The point we are anxious to emphasize, however, is that it was not a Canadian order that was given to a German firm and it will probably be some time yet before we shall consider it in the best interests of the Empire to follow such a course.

Big B. C. Merger of Power Interests Assures Aggressive Policy

By acquiring control of the Western Power Company of Canada, the British Columbia Electric Railway Company, Vancouver, B.C., has brought about the merger of electrical interests on the lower mainland of British Columbia. The deal whereby the latter company takes over the former was to be ratified at a meeting of directors in New York on December 23. The acquisition was accomplished mainly by the B. C. Electric Railway Company guaranteeing the \$5,000,000 of Western Power Company bonds.

The Western Power Company, formerly known as the Western Canada Power Company, had a capital of \$11,350,000, its president being J. D. Mortimer, 30 Broad Street, New York, who represented United States capital. Its plant develops 39,000 horse-power at Stave Falls, 31 miles from Vancouver, and besides selling 75 per cent. of its output to the British Columbia Electric Railway, transmitted power to the Puget Sound Power and Light Company at Sumas, Washington, and retailed light and power in the vicinity of Vancouver and New Westminster.

The Stave Lake development was originally started by the Stave Lake Power Company with John Henry as president and William McNeill, now acting general manager of the present company, as secretary. Local capital was invested and the company sold its interests to the Western Canada Power Company, with C. H. Cahan, K.C., of Montreal, as president. Mr. Cahan and his associates represented British capital. The Western Power Company which took over the Western Canada Power Company, was incorporated in 1916.

There have been only two power companies in the field in the vicinity of Vancouver, the British Columbia Electric Railway Company with plants at Lake Buntzen developing 84,000 horse-power, and the Western Power Company of Canada. The former purchased 15,000 kilowatts from the latter company and was under necessity of acquiring more power. The capacity of the Western Power Company's plant is 150,000,000 kilowatt hours a year, but can be increased by the raising of the dam and the installation of another unit to 200,000,000 kilowatt hours a year. The plant would then have a total horse-power of 52,000. It is expected that work on the additional unit will be undertaken immediately by the B. C. Electric Railway Company, the cost being estimated at \$1,000,000.

The B. C. Electric Railway Company acquires the power house just mentioned, 5 miles of standard gauge railway, 83 miles of 60,000 volt transmission line, 97 miles of 12,000 volt line and 28 miles of cables. There is a receiving station at

Ardley, near Vancouver, and small sub-stations in Vancouver and New Westminster.

The Stave River allows a second development, the site of which is also conveyed in the deal, three and a half miles below the present plant. This site is capable of developing 80,000 to 90,000 horse-power on a 50 per cent. load-factor. The cost would be \$8,000,000. It is not expected that development work on the second site will be necessary for two or three years at the present rate of increase in demand.

With the acquisition of the other company, the British Columbia Electric Railway Company will have an investment in the province of some \$65,000,000.

Mr. George Kidd, general manager of the B. C. Electric Railway Company, who completed the negotiations in the east, states that the acquisition of the other company will not mean that more power is available because the B. C. Electric has been taking 75 per cent. of the Western Power Company's output. Provided new capital can be obtained, the second development can be proceeded with in two or three years when required. For the immediate needs of the district, another unit can be placed in the Stave Lake plant increasing the capacity by 13,000 horse-power to a total of 50,000 horse-power. This installation would cost \$1,000,000.

Many Indications of Activity in the Electrical Industry

As indicating the continued activity in the electrical industry it is of more than usual interest to note the considerable orders recently placed with the Canadian General Electric Company. Part of this equipment has already been delivered, but much of it is for delivery during 1921.

They have recently received from the New Brunswick Electric Power Commission, St. John, N. B., which commission has recently been formed, the order for generators for their initial hydro-electric development on the Musquash River. This order covers 3 ATB 24-2900 kv.a.-300 r. p.m., 13,200 volt, vertical water-wheel driven generators, each complete with G.E. spring thrust bearing, direct connected exciter capable of exciting two generators simultaneously, and other accessories. These generators are practically duplicates of two others which the same company are building for the St. Margaret's Bay development of the Nova Scotia Electric Power Commission. In this latter case also the generators are for the initial development made by the Nova Scotia Commission.

The Ontario Hydro has closed an order for 21-5,000 kv. a., 110,000 volt core type transformers. These are step-down units intended for various existing sub-stations on the system. Another order is for four 60 cycle, 5,000 kv.a., 110,000 volt core type transformers for installation at Cornwall, where power is taken from the transmission lines of the Cedars Rapids Company.

The company have also closed a deal with the Ontario Hydro for five indoor oxide-film arrestors—maximum capacity 138,500 volts—and three outdoor oxide film arrestors, same capacity, for the Queenston development. These are the same as two that are installed at the Nipigon plant recently put in operation. The latter, however, were 126,500 volt capacity.

It has been said that the International Paper Company's plant at Three Rivers, Que., when completed, will be one of the show plants of the North American continent. The Canadian General Electric are putting in six synchronous motors for pulp grinding, to operate magazine grinders. The motors are rated at 2625 kv.a., 2400 h.p., at 72% power-factor, 240 r.p.m., 2200 volt, 3 phase, 60 cycle. With five motors running they will be able to maintain a power-factor of 90% lead. There are two motor-generator exciter sets, each with sufficient capacity to excite all six motors,

and two starting compensators each capable of starting the six motors in rapid succession. This will be in operation about July 1st.

Another interesting announcement is to the effect that the Canadian General Electric have sold two Scherbius equipments to the Canadian Electric Steel, Limited, Montreal. This system of motor control meets rolling mill requirements in every particular; the speed of the driving motor may be varied over a wide range and having once been set remains practically constant independent of load (in those exceptional cases where a flywheel is used, the control is equipped with a notching back relay which provides for effective utilization of the flywheel energy); the speed may be easily and quickly adjusted to the desired value; the equipment may be designed to meet any variation of load with speed, i.e., constant torque, constant horse-power, or of any variation between these two; the overload capacity of the main driving motor or any other of its desirable characteristics are not in any way affected.

An Inspiring Christmas Address Before Montreal Electrical Club

An eloquent address inspired by the Christmas spirit, was made by Canon Shatford at the Montreal Electrical Luncheon on December 22. He remarked upon the need for emphasis to be laid upon the Christmas spirit, in view of the serious times they were facing to-day. The Christmas festival was significant in that it denoted a birthday. All the world united in celebrating birthdays. There never was a time when human life was held so cheap as it was at present; this was the result of the war. Crime was rampant, and it was therefore imperative to direct attention to the value of human life. The Christmas festival was that of childhood, and in this connection the speaker alluded to the annual loss of 5,000 children in Montreal. No nation could possibly be strong if it neglected the children. Christmas, too, was a festival of good fellowship, when all the world was akin. The lesson of comradeship would, in a large measure, solve the industrial problems which now troubled the world. Such institutions as the Electrical Luncheon were of great value in extending the spirit of comradeship. There was an increasing need for the inter-mingling of men of all nationalities, especially in a country like Canada, and particularly in the Province of Quebec. Let them endeavor to understand the viewpoint of the other fellow, for it was only by this that they could secure unity. The speaker concluded by enlarging on Christmas as a festival of joy. There was, he said, plenty of pessimism in the world; let them be optimists. An optimist, he humorously defined, as a man who bought something from a Jew and tried to sell it to a Scotchman.

Mr. F. J. Parsons was the winner of a turkey, the prize in a boosters' membership contest. This he donated to be raffled for, the proceeds to go to the Children's Memorial Hospital. Mr. A. C. Towne bought the winning ticket, and in turn sold the turkey by auction, for the benefit of the hospital. Mr. P. H. Klein was the highest bidder and he donated the bird to the hospital, which will also receive \$65, the proceeds of the raffle and the auction sale.

By way of variation from the usual procedure, a programme of music and recitations was arranged at the Montreal Electrical Luncheon on December 15th. The following took part: Messrs. Bert Mason, M. Balzamo, E. Merchant, N. Richards and P. T. Davies.

A collection on behalf of the Christmas entertainment of the soldiers at the St. Anne de Bellevue Hospital realized \$81. It was decided to send a message of sympathy to Mr. Andy Carroll, of Eugene Phillips Electrical Works, Ltd., and one of the founders of the luncheon, who is seriously ill.

Manitoba Electrical Ass'n Hold Final Luncheon for 1920—Mayor Gray and Mayor-elect Parnell Speakers of the Day

On Thursday the 9th of December, the Manitoba Electrical Association held a very successful luncheon, which was largely attended.

Mayor C. F. Gray stated that it gave him great pleasure to be among the electrical men for two reasons; First on account of being himself an electrical engineer, second, on account of it being Westinghouse day—he being an old Westinghouse man and appreciating the eight years' experience he had with this firm. Mr. Gray considers that members of electrical firms should get into public life. It broadens one's mind—lawyers outnumber all other professions in the House of Commons and in public life.

The speaker was glad to see so large a membership present, it looked as though the old "knocking" spirit was a thing of the past. To be well organized means success in general; also it helps with regard to advertising. Electricity is a bigger factor than most other lines, as the majority of firms depend on electricity to run their plants. The people hardly realize what the future holds in the Dominion with its water powers.

The main thing in life is to do the best we can and leave a good name behind us. Take for example, the Kiwanis Club. One of the many good things they are doing is to look after widows and orphans. The Manitoba Electrical Association should stand behind some good cause, such as the Air Board, or the Navy League.

Look what electricity has done in the past war. Lord Fisher, when relieved of his position with the Admiralty, was put on the Inventions Board on account of his mechanical ability. Most British Naval Officers were first class engineers, either mechanical or electrical.

Mr. Gray, who has travelled considerably in the north country, especially around the Hudson's Bay Junction and in North from there, considers the possibilities of that country beyond conception; he figures the gold mines in the Herb Lake district will be paying dividends before the Flin Flon. Mr. Gray has travelled over the United States but has seen nothing in that country to compare with the Hudson's Bay Junction district.

Electrical men are needed in gold mining to improve conditions. The cost of steam power is excessive. The time is coming when steam power will be entirely replaced by electricity.

In conclusion, the mayor thanked the citizens, including his associates in the electrical world, for their loyal support and co-operation during the past four years, and asked them to give his successor, mayor-elect Parnell, the same co-operation and more if possible, as he has some splendid ideas which he hopes to introduce.

After several minutes' applause, Mr. L. M. Cochrane, thanked Mr. Gray for his fine address and extended a very hearty invitation for him to attend future meetings and to be "one of us." Mayor-elect Parnell was then called upon. Mr. Parnell considers we are liable to have more trying experiences for the next year or two than during the war, on account of the numerous adjustments to be made and so, consequently, he seeks all the co-operation it is possible to get. He stated he was very disappointed at the small amount of interest taken at his recent election, only about 30% of the voters taking the trouble to go to the polls on election day. His experience is that the man who finds fault is the man who does not bother to vote—few men would have gone through what Mayor Gray has experienced and come out smiling; few people realize the work and

responsibilities that are thrust upon the shoulders of a mayor. Mr. Gray very rarely got home to his family before 2 a.m. He was expected to be here, there and everywhere. If we send men to the Council and take no interest ourselves, how can we expect results? We must get the co-operative spirit this coming year and make Winnipeg one of the best and most prosperous cities on the American continent. Mr. Parnell said he will be found at the City Hall every day, and wants to see everybody work together. "Let us build a foundation that cannot be shaken."

Referring to the recent convention, Mr. Parnell who is a strong believer in co-operation can see already the wonderful results that have been attained. "Co-operation brings its rewards." The Convention had co-operation and energy among the electrical trade here, and it is up to the electrical trade to carry on the good work and bring it up to a high state of efficiency. "Do not leave it to the other fellow, do your share and do it well."

Mr. E. H. Smith thanked the speakers and stated that he was glad to say that the Association was now co-operating. The meeting concluded with the singing of the National Anthem.

Speaker at Luncheon of the Electric Club of Toronto Reviews Past Records

The members of The Electrical Club of Toronto on December 10th held an overflow meeting on the occasion of an address by Mr. George D. Leacock, one of the pioneer members of the club, and, as the chairman truly remarked, so well known in the electrical industry that he required no introduction. Mr. Leacock's remarks were of an historical nature, comprising a review, more or less accurate, but abounding in entertainment, of the events leading up to the formation of the club and of the outstanding features and personalities in its development during the four years of its existence. The gratitude of the club is due Mr. Leacock on two scores: First, that he came on the spur of the moment to take the place of another speaker who had been scheduled for that meeting, and second, that throughout his address he was perfectly natural and made no attempt to be humorous, which simply means, in other words, that he was funny enough to leave a number of the members in a state of exhaustion.

May the same obliging speaker be available next time the club's program is interrupted.

On the 17th, Dr. John Noble, chairman of the Public School Board of the city of Toronto, addressed the club on some features in the manual training of children. Dr. Noble is a strong advocate of learning to "do by doing." He believes in gymnastics, manual training, swimming tanks, sports, and all the other things which help to make the school life of the young boy or girl more happy and less monotonous. In Dr. Noble's opinion the weariness of the present school day is not due to its length nearly so much as to its monotony, and to the forced repression of energy which is so natural in young children and which it is so necessary should find an outlet.

A. I. E. E. Members Hear Dr. Millikan

A special meeting of the American Institute of Electrical Engineers, Toronto branch, was held in connection with the regular meeting of the Royal Canadian Institute in the Physics Building, University of Toronto, on Wednesday, December 22nd. Dr. R. A. Millikan of the University of Chicago addressed the meeting on the subject "The Twentieth Century's Contribution to Our Knowledge of the Atom."

Retrospect and Prospect

At This Season it is Customary to Take an Inventory—What Does It Disclose So Far as the Electrical Industry is Concerned?—Business was Carried on Under a Big Handicap During 1920—Indications That Worst of Our Troubles are Passing

Many special circumstances have hampered the conduct of business in general during the past year but it is encouraging to note that there is much optimism in the utterances of financial men and industrialists regarding the immediate future.

Canada, at the moment, is passing through a trying period as a result of an accumulation of high prices and indifferent "labor" followed by curtailment in buying, followed again in turn by the inevitable unemployment. Never before in history has the inter-dependence of our various operations in maintaining continuity in progress and development been so clearly demonstrated. It is easy enough to see that if men do not work they cannot buy, but it is not so easy to understand the converse of this, viz:—that if people will not buy they cannot work. The past three months has demonstrated this converse however. Whether it was merely a whim of the moment, whether it was an instinctive intuition of breakers ahead, whether caused by Sir Thomas White's luxury tax or from a combination of these and other causes, the fact is that the people almost suddenly stopped buying, the retail business fell flat, the manufacturer found himself with no orders to fill and, to complete the cycle, the employees—the buying public—found themselves in the street, so to speak, with no power to buy.

The situation has been aggravated, doubtless, by the large percentage of returned men who during the past year have been thrown on their own. As long as the government supplied the soldier with money he spent freely and to the limit of his allowance. Further than that, he found everybody else ready to do the same thing. When the soldier found himself without further gratuity the effect was felt by the retail trade and again, following the example, the general public began curtailing.

There is no doubt but that the public acted as they did largely under the impression that prices were due to come tumbling down—and no one cares to buy in a falling market. Thus unconsciously they produced to a considerable extent the very condition they anticipated. The condition is artificial, however, in many cases,

because the lower prices of the moment are not based on replaceable values, but rather on a condition of congestion caused by a sudden closing of the outlet. Merchants without number got stage fright and sought to save themselves and induce the people to buy by telling untruths and giving wrong impressions in their advertisements. In the main these efforts, though costly, have been without much result, as the public is still patiently waiting for something more to happen.

This briefly sums up the condition as we approach the end of the year 1920. Where, then, do the optimists get their inspiration?

To begin with, while the banks have disbursed loans with great caution for construction work of every kind there is surprising evidence of surplus funds among the Canadian people. A fair example of this is the reception accorded the recent Ontario loan. The provincial treasurer offered for sale five millions of bonds—but the public demanded and bought sixteen. Not only is this an indication that the general public have money to invest but it means that this large sum is now at the disposal of the Ontario government for extension work—roads, bridges, public buildings, etc., as soon as spring sets in. What is true in Ontario is doubtless true, in greater or less degree, in all our provinces.

A second reason for optimism is the promise of cheaper money next spring. Tangible evidence of the attitude of the investing man on this point is seen in the sustained prices of our Victory and War Bonds. Much private construction and manufacture has been held up on account of the difficulty of getting money except at a prohibitive rate of interest and cheaper money will help a whole lot.

The removal of the luxury tax is a third reason which will have a very important influence on the volume of retail trade. This tax was imposed with the avowed purpose of curbing extravagance and no one doubts that it has been very effective. While the removal of this tax will not, we hope, cause a reversion to the orgy of buying that prevailed a year ago, it is the general

opinion among retailers that it will relieve the tension somewhat and start things back toward normal.

Fourth, there is the exchange situation. With the Canadian dollar discounted in the neighborhood of twenty per cent., there is little inducement to import and a correspondingly greater inducement to buy home products. This will have a stimulating effect on our manufacturing industries.

Next, there is the natural accumulation of demand which is the inevitable result of a general holding back such as we have experienced during the past few months. People must have shoes, clothing, general provisions, etc. These things can be done without, to some extent, temporarily, but not permanently. A very open winter to-date has no doubt had a considerable influence in this direction, but the time must come, and soon, when the general public will be forced into the market.

Finally, there is accumulative evidence that the present prices of many commodities are not on a staple basis. The deflation of some prices has been too rapid. It has not been based entirely on reduced cost of production and to this extent there is certain to be a rebound. The history of past wars show deflation periods covering several years and the present war, in all probability, is no exception. As soon, therefore, as the public realizes that the bottom has been reached for the time being they will resume buying, likely in somewhat greater than normal volume, to make up for their accumulated demands and as insurance against later higher prices.

How soon will this trade revival take place?

That is a difficult question to answer. The depression came like a thunderclap—quicker than the worst pessimist predicted. The clouds, likely enough, will lift the same way. Financial authorities writing and speaking on the subject tell us that the stock market is a very reliable trade barometer. A few months before a trade depression is due this condition is foretold by a gradual reduction in the price of stocks, i.e., the trade depression hits the bottom from two to six months after the stock market. The revival, we are told, is heralded in the same way. A few months after the stock market starts upward a distinct improvement in general business is assured.

Judged by this standard one would estimate that we shall begin to climb the hill early in 1921. The stock market probably saw about its worst time in November and present indications are that, in the main, prices of stocks are either on the ascent or at least are approaching the point where the ascent begins. It would appear as if some few of the stocks have not yet been properly shaken out as, for example, the pulp and paper stocks, and readjustment in this industry may delay the advance somewhat. In the main,

however, the "market" seems to be about at bottom. If the next couple of months shows a distinct improvement we may then look confidently for a trade revival as one of our "spring openings."

In the horizon of the electrical industry there seem to be few clouds. It is true the retail trade has suffered somewhat, but there has been a very worthy absence of the price slashing sales so noticeable in some other lines. Indeed, the only offenders to date seem to be one or two department stores which will always be a thorn in the side of the legitimate electrical dealer until the industry becomes properly organized and manufacturers, wholesalers and retailers all recognize their mutual interdependence. A memorandum comes to the writer at the moment of a departmental sale of "\$7.00 irons for \$3.95." Co-operation should and can stop this promptly. It is just such practices as this that have thrown the entire shoe industry of Canada, for example, into the most chaotic mess in its history with its factories closed and its employees on the street. Shall we in the electrical industry not profit by such examples? While the industry is young let us form good habits.

Speaking of the electrical industry specifically, however, the prospects are very bright. The dreaded shortage of power in Ontario has been avoided, permanently, we hope. Building will resume early in the spring, for there is an ever increasing shortage of buildings of all sorts. One of our largest electrical manufacturers reports more orders on the books than at any previous period in history. Electric drive in practically all industries has come to be recognized as standard. Electric household equipment is generally classed among the necessities of life. Electric radials seem certainties of the near future as our population becomes denser.

The Dominion as a whole is not more than 10 per cent. saturated electrically—probably much less. With deliveries now coming through fairly promptly, with a general revival of trade impending and with a product to sell that is now universally recognized as the greatest time and labor saver in existence, the electrical industry should look to the coming year with confidence and enthusiasm.

It is something we must never overlook in our calculations, too, that we possess somewhere around twenty million horsepower of hydraulic energy at present going to waste. The resources of the Niagara and St. Lawrence rivers are a mere fraction of the total. East and West we have practically inexhaustible coal supplies. With what pride electrical men can contemplate the prospect of being the means of transforming these and other resources into a form in which they can be utilized for the benefit of the nation. Truly the electrical industry appears to hold the only key to open the door of Canadian prosperity and progress.

Water Resources and By-Products in the United Kingdom*

The British Board of Trade set up a water-power resources committee in 1918 to examine and report upon the water-power resources of the United Kingdom and the extent to which they can be made available for industrial purposes. This committee has brought out a second interim report, in the course of which the whole question is discussed somewhat fully. The reports in the possession of the committee dealing with a portion of Scotland alone show that nine water-power schemes there are capable of generating a continuous supply of 183,500 electrical horse-power, corresponding to an annual output at the hydro-electric stations of 1,200 million Board of Trade units.

Magnitude of Scottish Development Schemes.

The magnitude of these schemes will be better appreciated when it is pointed out that in the year 1917-18 the whole of the steam power stations in Great Britain (public undertakings for electricity supply and for electric railways and tramways, but not private power plants) generated 4,628 million Board of Trade units and consumed 7.16 million tons of coal. Upon the basis of the present average practice at coal-fired power stations, the nine potential water powers thus represent the equivalent of 1.85 million tons of coal per annum.

It would be entirely practicable to transmit the electrical energy developed at these water-power stations to industrial centers in Scotland, for example, to Glasgow, the Clyde Valley, Edinburgh and district, Aberdeen, and Dundee. Allowing for losses in transmission and transformation, the nine schemes could deliver at least 1,000 million Board of Trade units per annum within a radius of supply of 80 to 85 miles.

The importance of these schemes is further emphasized by the fact that the total number of Board of Trade units generated in the year 1917-18 by all the steam power stations in Scotland (including public utility undertakings, but excluding private power plants) amounted to about 537 million, and involved the consumption of over 806,000 tons of coal.

Cost Per Unit.

The estimated capital cost of completing the nine schemes would be £7,075,000, or an average per estimated horse-power at power house of £38 10s. The committee estimates that if the nine schemes were fully developed and fully utilized, the average cost of the electrical energy generated, inclusive of all running expenses and capital charges, should not exceed .15 of a penny per unit at the water-power stations. It must be understood that such a cost would only hold in the event of the continuous use of practically the whole output by works situated near the power stations, e.g., by electrochemical or metallurgical works.

The committee further estimates that the energy could be delivered into the industrial districts of Scotland at a cost which would be considerably lower than the present cost of electricity. The effects upon the districts would be markedly beneficial, smoke and dirt would be reduced, and a large quantity of coal would be saved or set free.

Undeveloped Resources of England and Wales.

Some of the witnesses who appeared before the committee expressed the view that there is comparatively little

water power in England and Wales remaining to be developed. The evidence of others on this question and the investigations and preliminary surveys undertaken on the committee's behalf do not justify this view.

For example, the committee is in possession of estimates or ascertained facts regarding the water-power resources of the Hampshire Avon, the Chester Dee, North Wales and Mid-Wales, Dartmoor and Exmoor, and the rivers in the West Riding of Yorkshire, representing a total catchment area of about 12,000 square miles. These figures will be set out in detail in the final report, but, summarized briefly, they indicate that in each of the instances quoted, i.e., for various districts which have different physical characteristics and climatic conditions, the possible water power resources average approximately 10 continuous horse power per square mile of catchment area. While it would be unsafe to assume that this average is applicable generally throughout England and Wales, the total area of which is approximately 58,000 square miles, and, while it is also obvious that it may not be commercially feasible to develop the whole of the power resources at present unused, nevertheless the figures justify the conclusion that the water-power resources of England and Wales, at any rate in parts of the country, are by no means negligible.

In several parts of Great Britain there are large sources of water-power, but very few inhabitants. The committee believes it unlikely that such sources will be developed unless some State assistance is available, and recommends that the department which is charged with the duty of developing water power should be provided with a fund for the purpose of starting enterprises in such areas, with the approval of the Treasury.

The Committee's Recommendations.

The final report of the committee is promised in a short time, but for the present the committee recommends that there should be established by act of Parliament a controlling water commission having jurisdiction over England and Wales, upon which should be conferred certain statutory powers and duties, among the principal of which should be

a. The compilation of proper records of the water resources and present and future water requirements of the country and the collection of information on these subjects through existing departments and other agencies as well as by its own hydrometric staff.

b. The allocation of these water resources in the general interests of the community, and powers to readjust existing allocations of water where hardship or anomalies are clearly shown to exist.

c. The adjustment of conflicting interests in connection with the use of water for a particular purpose.

d. To assist the Government departments concerned in the uses and control of water, the various local authorities and water-supply undertakings, and to afford assistance to parliamentary committees before whom water or water-power bills may be heard.

e. To confer with a statutory interdepartmental water committee with the view of avoiding duplication of the work and delay in procedure.

f. To group the watersheds of the country into suitable areas, and where desirable to arrange for the setting up of watershed boards.

g. To consider the development of rivers as a whole from source to mouth from the point of view of all water interests, and when necessary to initiate legislation for securing such development.

h. To bring forward proposals for improving the law relating to surface and underground waters and their utilization.

i. To appoint, as necessary, an advisory committee of committees of representatives of water undertakings, scientific institutions, consulting engineers, or other qualified persons for the purpose of giving advice or expressing opinions on any matters which come within the purview of the committee.

Accident Prevention in Factories

At a recent meeting of the Montreal Electrical Club, the Deputy Minister of Labor for the Province of Quebec, Mr. Guyon, gave an interesting address on the birth and elaboration of accident prevention work.

The speaker traced the history of the movement from its very beginning in 1857, when the French cotton-workers of the Rhine Valley founded an association and took measures which later produced very creditable results and aroused international interest in the subject. Mr. Guyon recounted a number of notable international gatherings at which the subject was discussed and methods of protecting the worker were demonstrated. Among these gatherings was one at Amsterdam in 1893; others included meetings at Paris, Berlin, Quebec, and New York.

An appalling array of figures was presented to show the pressing need for specialization in this field. For example, the losses arising out of accidents on U. S. railroads in one year represented more deaths than occurred on both sides during the three years of the Anglo-Boer War. The losses in American factories in one year were in excess of the total casualties sustained by the United States during the war with Spain. And so on.

The speaker made a strong plea for greater co-operation in the field of this enterprise. It was the aim of the department to secure a hall, and to co-ordinate all classes of exhibits tending to demonstrate the possibilities of protecting the worker in factories and machine shops. It was hoped to include in these exhibits special devices of interest to electrical operatives.

Mr. J. M. Mochon thanked Mr. Guyon for his very interesting address, and for the service he had rendered in bringing this important matter before the electrical industry.

Mr. P. T. Davies, vice-president of the Montreal Electrical Club, occupied the chair at the luncheon.

Barcelona Traction Has Good Prospects

An offering of £1,050,000, 8 per cent. secured debentures is being made in London on behalf of the Barcelona Traction, Light and Power Co., Ltd., with head offices in Toronto. This is part of an authorized issue of £1,100,000, and is being offered at 94 per cent., redeemable within twenty years. President E. R. Peacock, in a letter to the Spanish Securities Company, Limited, of London, which is handling the issue, states that the £1,050,000, offering has been created for the purpose of enabling the company to reduce its liability in respect of £1,915,500 of its own Prior Lien "B" bonds, issued at par in the year 1915 to French banks and other creditors of the company in settlement of previous cash advances, an operation now rendered possible by the fall in the French franc. Concerning the operations of the company, he said that the earnings of the operating companies should be greatly increased in future by the sale of electricity from additional hydro-electric works, which had recently come into operation, and also by the fact that existing power contracts, shortly expiring, would be renewed on more favorable terms.

St. John Getting More Power

Under the act by which the government of the Province of New Brunswick is developing the water powers of that province it is necessary that any power developed shall be offered first to the various municipalities in the surrounding neighborhood before being offered to private corporations. Having this in view the New Brunswick Hydro-electric Power Commission has been in consultation with the city of St. John with a view to the use of power now in process of development on the Musquash River. The city must

therefore decide whether it will buy power from the commission and distribute it itself or whether this distribution is to be carried on by the New Brunswick Power Company. A rough estimate of the cost of distribution to the city is two million dollars.

This idea of duplication of distribution systems has worked out so disastrously in Ontario that it surely should not be tried again, unless circumstances make it absolutely necessary. Two distribution systems covering the same area in the same city constitute an unwarranted and most foolishly extravagant expenditure.

Southern Canada's Earnings Increase

The earnings of the Southern Canada Power Company continue to improve. For the year ended September 30th the gross earnings were \$663,587, an increase of \$97,490, while the net stood at \$324,467, a gain of \$61,174. This year's surplus was \$71,657. The report states that during the year the distribution plants were extended to take care of the requirements of over 10,500 new customers which the company was serving at the close of the fiscal year. It is added that several new plants, requiring large blocks of power, are nearing completion in the different municipalities served by the company, and will shortly be added to the list of customers. At the meeting the board of directors was re-elected without change except in the case of Mr. James B. Woodyatt, who was elected vice-president as well as general manager. The board now stands as follows: Mr. W. C. Hawkins, president; Mr. James B. Woodyatt, vice-president and general manager; Messrs. W. K. Baldwin, M.P., James Davidson, J. S. Gillies, W. H. Miner, A. J. Nesbitt, George Parent, K.C., M.P., Chas. E. Read, J. M. Robertson, Harry Sifton, Lieut. Col. J. R. Moodie.

Hydro-Electric Development in France

A large hydro-electric plant of 20,000 horsepower has recently been completed by the Societe Hydro-Electric of Lyon, a branch of the Compagnie du Gaz, Lyon, and the Compagnie Continentale Edison of Paris. The plant is located at Seyssel, Haute-Savoie, France. Importance is attached to the completion of this project because of the present scarcity and high prices of coal, and likewise because of the effect it may have toward encouraging similar undertakings in France. The plant is equipped with four turbines each capable of developing 5,500 horsepower. It is proposed to install another turbine at an early date, and thus increase the production to 27,000 horsepower, an amount that equals almost one-third of all the energy consumed under different forms by the city of Lyon.

"Submarine Detection"

The Toronto section of the American Institute of Electrical Engineers had an unusually interesting meeting on Friday, December 10th, when Dr. J. B. Whitehead of Johns Hopkins University, Baltimore, spoke on "Submarine Detection in an Alternating Current Field." The speaker outlined the tremendous progress that had been made in this direction during the war. The perfection of detection equipment would appear to have removed almost entirely the possibilities of submarines being a serious menace in future wars. Dr. Whitehead has been one of the most prominent research students in this direction, carrying out important investigations at Johns Hopkins, and later at the United States Naval Academy. The results of his investigations were published in the journal of the institute in March and April, 1920.

Further Opinions re Customs Statistics in Electrical Industry

Editor Electrical News:—

Toronto, Ont.

We wish to acknowledge receipt of your letter of December 17th and have also looked over the suggested classification given on p. 28 of "Electrical News" of December 15th. In going over this list, it is impressed upon us that quite a number of articles and materials are not mentioned, neither do they lend themselves to inclusion in any of the suggested classes.

We might, as an example, mention Underground Fibre Duct. This, we feel, should be given a classification of its own in view of the special nature of the material. We might make the same comment upon a number of other lines which, from their character, are indicative of activities in the electrical industry and if they were buried in any other item would tell us very little.

It seems to the writer that the best way to reach a common basis on this question is to have a joint meeting of manufacturers and jobbers and discuss the proposed classification item by item, together with any additions which may be suggested. In this way, a classification satisfactory to all concerned could be quickly arrived at. Once this is properly established, an effort could then be made to have the Statistical Department at Ottawa adopt same.

Yours truly,

Canadian Johns-Manville Co., Limited.
Thos. M. Staunton, Manager Electrical Department.

* * *

Toronto, Canada, Dec. 21, 1920.

Editor Electrical News:—

We wish to acknowledge receipt of your letter of the 17th, regarding statistical information at the disposition of the electrical manufacturers and jobbers of this country. The different articles pertaining to this matter, which have been published for the past month, have been noted with interest.

We believe that the suggested classification as outlined by Mr. Johnson, is a splendid idea, and should originate many interesting discussions. However, we think that "fibre-insulating" hardly covers the uses of fibre in the electrical field. We would therefore suggest the following:

Gears—

- (a) Fibre, noiseless.
- (b) Condensite Celoron, waterproof, noiseless.

Fibre, hard vulcanized—

- (a) Pulleys.
- (b) Handles.
- (c) Bushings.
- (d) Feet.
- (e) Panel boards.
- (f) Thrust washers.
- (g) Wheels.

We find that many manufacturers are using fibre only as an insulation and are not aware of the many varied uses in which fibre has been tried and proven superior.

Very truly yours,

Diamond State Fibre Co. of Canada, Ltd.
T. E. Webster, Manager.

* * *

Editor Electrical News:—

Hamilton, Ont.

Answering your favor of the 17th regarding the discussion which is going on in Electrical News with a view to having fuller statistical information kept recording oper-

ations of the electrical industry, we have read over the classification suggested by the Northern Electric Co. in Dec. 15th issue and to us it seems quite comprehensive and should yield all the information required. As a matter of fact, we are not in a very good position to judge the classification from the standpoint of the supply end, as we are almost exclusively interested in electric lighting fixtures. For this reason we do not really feel justified in taking any part in the discussion, as we feel that before doing this we should make a closer study of the subject. We are nevertheless in sympathy with the move and feel that this important branch of industry has not received the attention in the past that it deserves.

Yours truly,

Tallman Brass & Metal, Limited.
T. S. Turnbull, Fixt. Dept.

B.C.E.R. "Kiddies" Have Jolly Christmas Party

The children of the office employees of the British Columbia Electric Railway Company, Vancouver, B.C., jammed the head office building of the company on Saturday afternoon, December 18, at the second Christmas entertainment held by the office employees' association of the company. Santa Claus arrived through the chimney and, with the help of Mrs. George Kidd, wife of the general manager of the company, distributed presents to every one of the three hundred youngsters who filled the fourth floor of the building. There were four Christmas trees laden with presents. A fund of \$350.00 was raised by popular subscription from the office staff, to which the management of the company contributed generously. Then a committee bought presents for every child whose name was obtainable. Taking an active part in the festival also, were Mr. George Kidd, general manager; Mr. W. G. Murrin, assistant general manager, and Mrs. Murrin and others of the company officials. The evening ended with a dance for the older members of the company's family.

The Peruvian Government has granted a 60-year concession for the construction and operation of a new standard-gauge electric tramway which will run from Lima to La Punta, a distance of 7 miles. The cars to be used will be of the storage-battery type, which require no overhead wires. It is stated that the new company will have a capitalization of approximately \$1,000,000, all of which has been subscribed by Peruvians.



Magistrate: "But, Mr. Goldstein, why do you have your house and your business in your wife's name?"
Mr. Goldstein: "Well, you see, I'm not a beesness man."

Wireless Achievements

By E. F. W. Alexanderson*

Wireless achievements are often referred to as belonging in the realm of mystery and it is indeed wonderful that we are now able to speak with a voice that carries through empty space across the oceans. Whenever knowledge conquers a new force of nature for the use of humanity, it ceases to be a mystery, but the pursuit of this knowledge makes an even greater appeal to the imagination.

The development of the steam engine was a triumph of the engineering art of the last century, but it was not the engine itself, but the steamship and the locomotive that interested humanity.

The telephone and cables no less than the steam engine have introduced a new era in human affairs. They have, to a degree, conquered space and time, but only with certain serious limitations.

An ocean cable runs only from one landing place to another and it can be cut in times of war; its use can be censored by its owners and controlled by military and naval power. When, on the other hand, you send a radio message it reaches all parts of the world. Depending upon whether it has been sent in code or in plain language, it may be a confidential private message or a press message intended for the world at large, but nobody can prevent the electromagnetic waves that carry the message from reaching their destination. It is thus not exaggeration to say that the emancipation of the human spirit that was begun by the invention of the printing press has found its fulfilment in Radio communication. Radio makes the transmission of ideas from man to man and from nation to nation, independent not only of any frail material carrier, such as a wire, but above all it renders such communication independent of brute force that might be used to isolate one part of the world from another.

The starting point of this development work was the time when Fessenden brought to the General Electric Company the problem of generating alternating currents for radio transmission. In doing so Fessenden realized that a practical solution of this problem could be worked out only by an organization of specialists.

Some of the problems that presented themselves in the evolution of the radio power plant were:

The design of a dynamoelectric machine or alternator generating electric power in the form of alternating currents of frequencies one thousand times as great as those used for motors and lights.

The development of magnetic amplifying devices capable of translating telephone and telegraph currents into corresponding modulations of the high frequency energy flowing from the power plant into the radiating antenna.

The development of a regulator so sensitive as to hold the speed of an ordinary induction motor constant within a few hundred of one per cent., this being necessary in order to maintain the proper phase relations in a load circuit working at one-third of one per cent. power factor.

Improvement of the tuning of the antenna so as to transform as large a part as possible of the generated energy into electromagnetic waves.

The realization of Fessenden's vision, the radio power plant of to-day, became thus the result of the combined effort of leading electrical and mechanical engineers. Among these, it is sufficient to mention W. L. R. Emmet the creator of the giant electric power stations of to-day.

The radio power plant which resulted from this was

shown to Marconi during a visit to Schenectady, and because of his interest in its performance, it was transferred to the Marconi Radio Station in New Brunswick.

Here we had arrived at a point where two schools of engineering pursuing different aims with widely different modes of thought, had been brought before a common problem. The one had been thinking in terms of power factor kilowatts and phase displacement, the other in terms of wave length decimeters and tuning.

A third school of knowledge was at that time brought into contact with this technique and added new impetus to it. As soon as such scientists as Coolidge and Langmuir began to study the remarkable little device invented by Lee DeForest, and known as the audion, the foundation was laid for the vacuum tube technique which has so profoundly influenced the art of radio communication.

These scientists tell us that electricity is not the mysterious power fluid that we may have imagined flowing smoothly in our wires, but miniature planets or comets of condensed material electricity of definite charge and mass shooting across a miniature universe inside of a glass bulb and following orbits that can be calculated as accurately as the orbits of the stars.

Keeping in mind the origin of the modern art of radio communication in these three widely separate realms of knowledge, power engineering and electro physics, we may now proceed to examine the essential parts. We find then,—first, a modern electric power plant working at high frequency; second, a network of wires a mile long, supported on tall masts; third, on the opposite side of the ocean a little glass bulb full of shooting stars. The question is: What does really happen?

Does the electricity generated by our alternator emanate from the antenna and flow in an undulating stream through the air or through the water or through both? If we search for it in an aeroplane, we find it, and if we submerge ourselves in a submarine and search for it, we find it, and yet we are told it is not so.

Does the little electron, as an individual, take a leap off the serial wires and after devious paths find its home in the glass bulb on the other side of the ocean? We are also told that it does not.

If I knew what really does happen, and should try to tell you, then sooner or later somebody would claim that I was altogether mistaken. Therefore, I will only try to tell you how I imagine that it happens, wondering if any of you will see the same mental picture of the process that I see.

We were once told by the physicists that all space was filled by a fine substance that was called ether, and that the light and heat that radiated from the sun was a wave motion in the ether. The physicists now tell us that there is no ether, but still they say that light is a wave motion. Be this as it may, for the purposes of visualizing what takes place in radio transmission, it is convenient to cling to the theory of the ether.

We are familiar with other forms of wave motion—the air waves that carry around to our ears and the water waves on the ocean. Thus the carrier of the radiated electric energy must not be likened to the flowing stream of water, or to the wind or to a bullet shot from a gun, but likened to a wave in a uniform medium where each particle of the medium oscillates around a stationary base line while the wave rolls forward.

The distance that a wave can travel before it fades out

*Chief Engineer Radio Corporation of America, Consulting Engineer General Electric Company.

proportional to its length. We may therefore introduce the idea of wave length, which is the distance from the crest of one wave to the next. The long swells of the ocean travel for hundreds of miles, whereas, a pebble dropped on a still surface of water produces a ripple that fades away in a short distance.

In radio communication it has been observed that the distance over which reliable communication can be maintained is about 500 times the length of the ether wave that is used. It may be more than a coincidence that the distance to which a sound wave travels in air, and a wave on the surface of water will travel before it fades out is also about 500 wave lengths. The average wave length of sound of spoken words is about one foot, and we know that if we speak loud our voice will carry a distance of about 500 feet. The exceptions to this rule that will occur to anybody are also significant. We know what distances voices will carry over a lake in a quiet evening. We also know what extraordinary distances radio signals will carry sometimes on a quiet night. These are exceptions that prove the rule and the rule refers only to reliable communication under normal conditions.

A radio transmitting system is designed for the purpose of producing waves in the ether which we call electromagnetic waves, and for controlling the rate at which the waves are produced, in such a way that a train of successive waves will carry the meaning of articulate speech or telegraphic code. If we wish to send a message a long distance, we must select a long wave. The distance to Europe is 5,000 kilometers. If this distance is to be bridged by 500 wave lengths, each wave length must be at least 10 kilometers (six miles) or as it is usually expressed a wave length of 10,000 meters.

We can produce water waves by rocking a boat. If we rock a canoe we get a short wave, but if we rock a larger boat we get a correspondingly longer wave. To rock the boat requires energy, but in order to produce a wave of suitable length, the energy must act through an intermediate member which has suitable size and proportions.

In radio transmission the energy is furnished by the high frequency power plant, but in order to transform this energy into waves there is required the intermediate member which makes contacts with a large volume of the medium which carries the wave motion. This medium is the ether and corresponds to the water or the air in the more familiar forms of wave motion. The member that transfers the energy to the ether is the antenna. The waves used for transatlantic communication are as a matter of fact 10,000 meters or longer. The antenna corresponds to the hull of the rocking boat or the sounding board of the piano.

The analogy with water waves may be carried still further. The wave is a successive displacement of the medium and the initial displacement produced by the member acting upon the medium is proportioned to its volume. The water displacement of the boat corresponds to the effective volume of the antenna. The maximum voltage at which the antenna can be operated corresponds to the maximum angle to which the boat may be rocked before it ships water. This is the voltage at which the surrounding air breaks down under the electrostatic pressure. In electrical units the displacement in the ether is expressed in ampere meters. This is really a measure of volume as is apparent from the consideration that the amperes charging current at the limiting voltage is proportional to the two horizontal dimensions. The third dimension or the height appears directly in the product and is expressed in meters.

The height of the antenna is the most expensive of the three dimensions by which we may create electric displacement in the ether. The tendency in stations designed for greatest economy is therefore towards structures of moderate height and great length, whereas, the tendency in the past, when dynamic efficiency was the principal consideration, was

towards towers of great height. The unit of performance on the old basis was kilowatts consumed by the antenna. The unit on the new basis is ether displacement. This modern measure of antenna radiating capacity is the number of ampere meters of ether displacement that can be produced at the voltage which is limited by the breakdown of the air.

The antennas of the stations of New Brunswick and Marion, which are now used in trans-Atlantic service, are each one mile long. In the new radio central station which is being built by the Radio Corporation on Long Island there will be ten or twelve antennas, each a mile and a quarter long. This station is intended to communicate efficiently with all parts of the world. When very long distances are to be spanned correspondingly long waves will be used. For efficient transmission of these long powerful waves an antenna will be needed that makes contact with a large volume of ether. This will be accomplished by combining several of these antennas into one unit. At other times the same antennas will be used for the simultaneous transmission of several messages over shorter distances.

The shifting of radiation power which has been referred to is made possible by the use of the multiple tuned antenna, which has been described in a previous paper before the Institute of Radio Engineers. The New Brunswick and Marion antennas are now tuned so that each acts as six single antennas operating in multiple. The combining of several units in multiple is only a further extension of the same principle.

When two such antenna groups are connected in multiple the loss resistance is reduced to one-half. Hence the efficiency of the antenna is increased so that a given power produces more radiation. Still more important is, however, the fact that more power may be utilized at this increased efficiency and so the net result is that the amplitude of the radiated wave is doubled, which means that four times as much energy is radiated.

The economical factors that point to the radio central station as the practical solution of the problem of long distance communication are practically the same as those that created the central electric power station. Broadly speaking, they provide for the utilization of the plant investment and operating force to the utmost by shifting the equipment from one service to another and combining it to meet various demands.

While it is winter on the northern hemisphere, the radiating power to Europe can be much reduced, but this is the season when the South American traffic requires a maximum radiation because of summer conditions then existing on the southern hemisphere. The New York radio central station can then divert some of its radiating power from the European to the South American circuits. There will also be daily fluctuations in traffic load which will occur at different hours due to the difference in geographic longitude. Thus the peak load of European traffic will occur at different times than the South American and Western traffic. The central station equipment can be utilized so as to take advantage of this.

The realization of trans-Atlantic telephone for commercial purposes is another object of the Radio Central installation. Trans-Atlantic telephone will, no doubt, be a luxury for some time to come. The radiation intensity needed for telephony is much greater than for telegraphy, and a plant designed purely for telephony might prove prohibitively expensive. However, the flexibility of the radio central where any number of antennas can be combined when desired to produce a more efficient radiation will make an extra powerful transmitter available when needed, while, the plant may be used in a more economical way at other times for telegraphy.

The Crouse-Hinds Company of Canada have issued bulletin No. 1000 N. illustrating and describing their Metal Obround Series Condulets.

Is it Economical to Replace a Steam Driven Air Compressor with one Electrically Driven?

By J. W. Hughes*

There is no universal answer to this question. There is no doubt that a well maintained steam driven air compressor possesses certain advantages that are only equalled or approached by the power driven type by the use of more or less complicated and expensive apparatus. The average load of an air compressor is very intermittent, and it is therefore desirable to supplement a compressor of the power capacity with a receiver of ample dimensions. This type of compressor lends itself conveniently to pressure control, maintaining on the receiver an average working pressure of say from 80 to 100 lbs.

The repairs and general maintenance are quite in line with the knowledge of the average stationary engineer, and there is no excuse for other than continuous service. Unfortunately all steam driven compressors are not "well maintained." The steam and air cylinders are not periodically indicated, adjustments necessary to increase the inefficiency are lacking, and this gives rise to conditions which remove all doubts as to the advisability of incurring the expenditure to make replacement with the electrically driven type.

In considering this question one must not lose sight of the fact that during a great portion of the year, the exhaust steam from the air compressor is well made use of either direct to the low pressure heating system, or for increasing the heat of the boiler feed water, or for heating water for other purposes where live steam would be required were it not for the presence of exhaust steam. This is particularly true of the Canadian Provinces which experience fully seven heating months of the year when no exhaust steam is allowed to escape to the atmosphere unused.

It should be borne in mind, however, that exhaust steam from air compressors, ammonia compressors, boiler feed, vacuum pumps, etc., is not always made the most of—it being a more simple means of overcoming complaints of insufficient or improper heating by the unscrupulous engineer varying the make-up supply of live steam rather than going to the trouble of locating the reason of the improper functioning of the economical heating system.

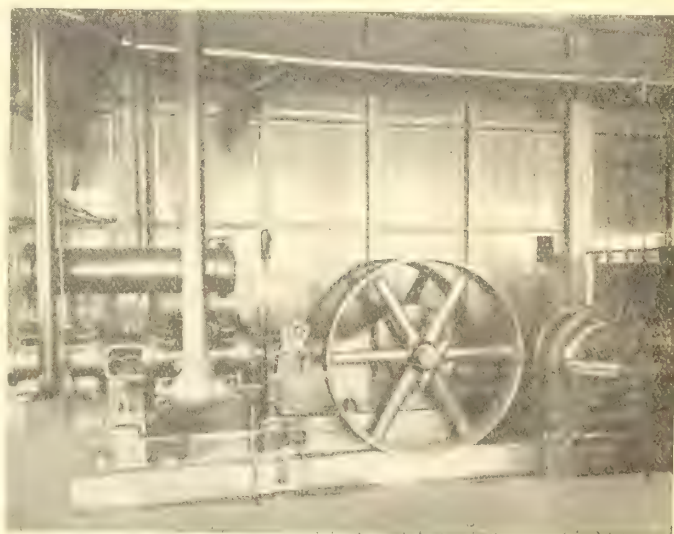
In the days of bituminous coal at \$3.00 per ton, the efficiency engineer was called upon to make exhaustive operating tests and unlimited calculations to prove to his management that an expenditure for electrically driven equipment would result in sufficient saving in operating costs to guarantee an attractive return on the investment. With the larger concerns, of course, there lies the advantage of moving the supplanted equipment to a point where it is required, and where suitable electric power cannot be purchased, thereby avoiding an otherwise necessary expenditure.

With fuel at more than double this amount, however, the electrically driven air compressor has come into its own. To start with, the benefit of a modern equipment is obtained, and auxiliary attachments have been developed with the view of obtaining the most economical service. Electric power is usually purchased at a fixed price per h.p. of maximum demand, plus a charge per kw. hour consumption. An equipment with reserve capacity of 25 per cent. is usually

installed and adjusted by the belt drive to give as closely as possible the present capacity required, thereby suffering a slight decrease in efficiency. The maximum demand is not thereby greatly curtailed, as the true horsepower is corrected by the power company on a basis of 85 per cent. or 90 per cent. power factor—the power-factor of the motor having decreased with the reduced output of the compressor.

The kilowatt-hour consumption, however, is reduced by the fact that the compressor is not run light when no air is being drawn from the mains. This is specially valuable during night operation when the demands are extremely light in comparison with the day time requirements.

The motor is usually of the wound rotor type, and controlled with a pressure regulator in conjunction with an automatic compensator panel with current limit acceleration. Careful adjustment of the output of the compressor to the requirements is necessary to avoid excessive stopping and starting of the motor, in which case trouble is not limited



Air Compressor Driven by Slip-ring Motor

to the contractors on the starting panel, but is experienced on the rotor connections of the motor as well. Working pressures of 80 and 100 lbs. are found to suit average conditions, and periods of running and at rest of 6 and 4 minutes respectively during the busy position of the day are handled without difficulty or excessive maintenance. The compressor intake is equipped with a magnetic unloader so controlled from the starting panel that the motor comes up to normal speed before the unloader comes into operation.

An auxiliary valve is installed to enable the compressor to unload mechanically and permit the compressor to operate continuously, should this be desired. This is particularly necessary in case of heavy demands for compressed air or when the drop in voltage caused by the starting and stopping of the motor is objectionable for one reason or another.

At points where water is purchased on a metered basis, the flow of cooling water, through the cylinder jackets, is

*Electrical Engineer Canadian Pacific Railway Company, Montreal.

magnetically controlled, that is, it flows only when the compressor is in operation. The rejected water from the cooling jackets becomes slightly heated and is forced to the boiler feed water heater.

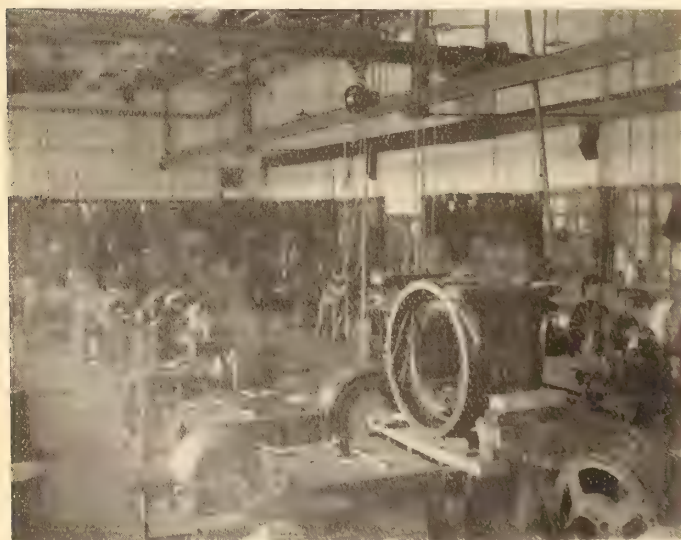
This type of equipment to capacity of 732 cu. ft. of free air compressed per minute has been used with good results driven by a 125 h.p., 900 r.p.m., 2200-volt wound rotor motor. The photograph shows a typical installation, with a 472 cu. ft. compressor and 75 h.p. slip ring motor with short belt drive and idler

The compressed air from the compressor before reaching the receiver is passed through cooling coils, consisting of a series of one inch pipes connected vertically between two headers. The moisture is precipitated into an auxiliary drum and automatically drained to waste.

The reply to the question "Is it economical to replace a steam driven air compressor with one electrically driven" has been made in a very elementary and non-technical manner. Exhaustive tests before installation and practical results after actual installations, however, have conclusively proved it is economical, and returns of from 20 per cent. to 40 per cent. have been obtained on the investment expenditure, the results varying on the per cent. of efficiency maintained on the steam driven equipment and the extent to which exhaust steam could be utilized. In many cases the electrification of the air compressor would permit shutting down the steam plant during five months of the year, with the resultant heavy saving in fuel and wages.

Up-to-date Repair Department in Angus Shops of Can. Pac. Ry. Co.

A most up-to-date electric repair department is that of the Angus Shops of the Canadian Pacific Railway, Montreal. Every branch of electrical work is carried out here, including armature winding both for a.c. and d.c. motors, and Pyle headlight dynamos. From the photograph here produced,



Electrical Department C. P. R. Angus Shops, Montreal, P. Q.

you will note in the foreground of the shop a d.c. armature which has just been rewound; beyond this is another armature which has just been stripped preparatory to rewinding. On the right, is an a.c. motor well on the way towards completion.

At the far end of the shop, Pyle headlight armatures and Stone armatures for locomotive and car lighting are being re-wound. The back portion of the shop is used as a testing room. Here, all motors which have been repaired are tested under a very heavy load before they are sent out. A notable feature of the shop is the armature rack. In this rack spare armatures for the most important motors in the plant are kept. The right-hand side of the shop is occupied by lathes for coil winding and for turning armature commutators.

In this department, electrical repairs of every description are done. The Canadian Pacific Railway Angus Shops occupies an area of about five square miles, and, without a doubt, are the largest railway shops in the world. The electrical department occupies a very important place in these works. Every machine in the plant is driven by electricity. A large staff of men is employed to inspect the motors and see that they are always in first class condition. Electric cranes, ranging from two ton to the powerful sixty ton cranes which carry locomotives from one place to another, also come under the jurisdiction of the electrical department. These are carefully inspected from day to day. The fire alarm system of the works is also looked after by the electrical department. It is a most modern one—fire alarm boxes occupying conspicuous places all over the plant.

Besides carrying out repairs for the plant, all motors on the Eastern Division of the Canadian Pacific Railway, in need of repair, are taken care of by the Angus Shops.

When

James H. Heron.

When in the silence of the night,
When darkness hugs the world so tight,
When all is hushed and quiet with sleep,
Then haunting memories round me creep:
When I can spend that hour alone
And find the man I've never known;
When I can meet him face to face
And there commune with ME apace;

When I can take myself in hand
And measure up just how I stand;
When I can gaze into my heart
And see my worth upon life's chart;
When I can look back o'er the road
And count the times I've shirked my load
And estimate the hours I've spent
On things that were not permanent;

When I can realize the crime
Of spending worthlessly my time;
When I can call things by the name
I ought to, and accept the blame;
When I can place where it belongs
The reason for my countless wrongs;
When I can pile in one great heap
My faults, the harvest I shall reap;

Then knowing what I am can say,
"From this time onward, from to-day,
I'll work and serve and will to win
To mould a better man within;"
So, when I turn the searchlight on,
The faults I had will all be gone,
And there shall stand revealed to me
The man God meant that I should be.



Electric Railways



Publicity - Publicity - Publicity The Man on the Street is in the Dark Regarding the Problems of Electric Railways—Publicity the Only Solution

By B. J. Mullaney*

Out of the circumstances of the past five years, members of utility commissions, some other public officials and many business men have been acquiring a better understanding of the problems of public utilities. But the man in the street—the public to which all official and regulatory power bows in the long run—is still in the dark. The inevitable consequence of this public ignorance is public suspicion and hostility. The antidote to it is education. For as surely as ignorance breeds suspicion and hostility, so education and enlightenment will breed friendliness.

Matter Must Be Made Interesting

Our business and its problems and its relation to the public must be, in some way, made interesting to the man in the street before he and his fellows, who constitute the public, will take much notice of us. The means to that end is the thing called publicity. I despise the term, but have not yet been able to invent a better one.

Ways and means of education by publicity are as varied as our contacts with one another in everyday life. Opportunities for this are all around us; conversation across the lunch table, or in the smoking room of the sleeping car; addresses to the Chamber of Commerce, the Rotary Club, the Women's Club, or other civic organizations; cultivation of better understanding of the business they are in among our employees; statements to users of the service, to security holders and so on.

Newspaper the Best Medium

But the best channel of all for educative publicity effort is the newspaper. That is the fact whether we like it or dislike it. It is the fact, because it is literally true that almost everybody reads the newspapers. Certainly, the very few who do not read them follow the lead of those who do. We hear men say they do not read the papers. Whenever you meet a man like that, you will find, if you will watch his conversation, that his whole mental attitude on the current topics of the day is colored by what he has been reading in the papers. If the public holds erroneous ideas about public utilities, those ideas have reached the public mind mostly through the newspapers, and the logical route to dislodging them is through the newspapers. All of the other indicated channels for educational effort are useful, but their usefulness is multiplied when opportunities for newspaper publicity are fully employed; they can be used to supplement the newspaper but they cannot take its place.

How Best to Use Newspapers

In dealing with educative publicity, we are dealing with the intangible. We cannot promise exact results. We cannot even lay down hard and fast rules of procedure. But there are some well established "do's" and some "don'ts"

to be observed. When these are applied with intelligence, plus a reasonable degree of special knowledge in this special field, good results are as certain as anything can be.

To be effective, educational publicity in behalf of a utility company, a branch of the industry, or the industry as a whole, must "come clean" both in methods and motives. If we do not start with that idea paramount, there is no use in starting. False pretenses, specious arguments, half truths, one-sided presentation of facts, do not get us anywhere. In fact, they have the contrary effect, because: the only kind of publicity or educational matter that is any good is the kind that is used, the kind that gets itself printed and read. If it goes to the wastepaper basket, it is simply wasted labor and material.

Right here somebody asks, mentally if not aloud: What kind of educative publicity matter will be read? Again a categorical answer cannot be honestly made. It is easier to indicate the kind that will not be used.

Primarily (and I say this in all courtesy), matter for use in newspapers or elsewhere, which utility managers think is "great stuff" is probably poor stuff. The utility manager is seldom a good judge. If he is a first-class manager, he sees only one side of the case and sees it so earnestly that his judgment of the other side is obscured.

Present Facts and Avoid Arguments

Facts, not arguments, should be the foundation of all publicity effort in behalf of street railways, gas, electric light and power, telephones or any other branch of the public utility industry, as well as in behalf of the industry itself: the fundamental economic facts of the industry plus the special or "personal" facts of origin, construction, operation, maintenance and so on.

A fact is the strongest thing in the world. A group of them, properly marshalled, is impregnable. An argument is never stronger than the facts behind it, plus—or minus, as may be the case—the influence of the arguer's personality and persuasiveness. Arguments provoke controversy and the man is not yet born who can frame an argument that is proof against a "come-back" of some kind. Facts, on the other hand—real facts—speak for themselves and are unanswerable.

Facts are also better than arguments in presenting the economic situation of the utility industry, because they produce better and more stable results. We can make an impression upon a person, or a group, by some brilliant argument or sensational presentation of a particular matter, as by a smashing editorial or a cleverly written magazine article, but the effect of that is fleeting. The impression that lasts is the impression that is built up by reading a three-line item here, a two-inch item there, a half column somewhere else and so on until the reader eventually acquires an impression and an opinion without knowing where he got it. Impressions thus created are permanent until statements of fact at the bottom of them are controverted. In every branch of the public utility industry we have an abundance of facts that can be made interesting and instinctive and therefore helpful educationally. If we make proper use of these resources, the public will absorb them and from them will rise the kind of public opinion that we

*Director of the Illinois Committee on Public Utility Information before the Central Electric Railway Association at Indianapolis.

all want—an informed and well-grounded and stable public opinion.

It Pays to Advertise

The place to start getting educational publicity matter used, established and made effective, is in the home town newspaper and the person to get it started is the local utility manager. The way for him to start with the home paper is by using the columns of that paper to advertise his business.

Many managers of public utilities think they have nothing to advertise unless they happen to have gas or electric appliances to sell; that use of their transportation, or other utility service, comes automatically; that the public must use it or do without. The biggest thing they have to sell is their service and the biggest factor in selling their service is good-will.

Selling Good-will Is the Proposition

Business of every kind is largely a selling proposition. The largest single factor in selling anything is good-will, whether it be the individual good-will of a purchasing agent or the mass good-will of a purchasing public. The more good-will, the more sales. That has been demonstrated over and over again—so often that it ought to be no longer debatable. Using the advertising columns of the home town paper to cultivate this good-will for your public utility service is the intelligent thing to do.

Electric Railways Should Furnish News Items

It is a theory widely held that this home town newspaper, of which I am speaking, lives on the advertising carried in its columns. That is not so. The newspapers live on the news carried in their columns. The advertising is incidental. If a newspaper is not printing news, and so printing a newspaper that the people want to buy and read, it will not have circulation enough to make its advertising worth buying. Hence it is intelligent public utility management to help the local newspaper get news and publish it.

If you are building something, tell the paper about it. If you are going to do something as an individual, or as a company, that will be news to the community, let the newspaper publisher know it. He will print it and except in rare instances, he will treat you fairly. If a newspaper publisher once in a while does give you the worst of it, or assumes an attitude antagonistic to your utility business, do not let that stop you from going to him and talking it over with him. Thrash it out with him and the public every time any kind of a controversy comes up in your relations with the public. If a local politician, or anybody else, jumps on you and you have a good case (and if you have not you ought not to be in the business) go to the local newspaper office and see that your side of the case is presented. In 99 times out of 100, you will be welcome and your side will be fairly presented. Nothing has done more harm to the utility business than the habit of the old fashioned utility executive who always said to the newspaper reporters, in case of a strike, or franchise fight or any other subject of controversy: "We have nothing to say for publication."

Furnish Reliable Information to Newspapers

It is not to be expected that the local utility manager can provide his interesting information on the fundamental economics of the utility industry in its various branches, publication of which is our ultimate object. The industry itself and its various branches can and should provide the information. This should be done on an organized and consistent basis and the informational material collected, compiled or prepared should be made available to every kind of publication. But results will be immensely enhanced if

the organized, educational, publicity effort has the co-operation of the local utility manager as suggested in his home town.

These observations on the usefulness of publicity in the public utility industry and ways and means of getting it are not carelessly coined phrasings of closet theories. On the contrary, they are the product of hard experience. Their practicality is represented in the work of the Illinois Committee on Public Utility Information (and eight or ten similar enterprises in neighboring states), which is from first to last built upon the principles roughly sketched in the foregoing.

The Work of the Illinois Committee

The Illinois Committee has been at work now about a year and a half. It sends out regularly informational matter ready for use in the newspapers, which some of the keenest, practical utility men in Illinois think is all helpful material, and from 250 to 300 newspaper columns of this matter are used every month in the newspapers of that one state. As a by-product of the newspaper publicity work, pamphlets on various phases of the utility industry have been published, which have been circulated throughout the United States by the larger utility interests, literally by the hundreds of thousands of copies. Educational matter produced by the Committee, again as a by-product of this newspaper work, goes by request to all of the libraries and higher educational institutions in the state. The state's university, by request, receives 300 copies of everything we print. Speakers Bulletins—simple hand books, by the use of which almost anybody can work up an intelligent public address on some phase of the utility industry—have been published and circulated by thousands of copies. In nearly 100 Illinois communities, the local utility managers are banded together as a local Speakers Bureau and are always on the alert for, and are utilizing opportunities to put on a speaker at the Chamber of Commerce, at the Rotary Club, or wherever a rostrum and an audience can be found, to discuss some phase of the utility business. About 900 Illinois high schools have requested and are regularly receiving and using educational information matter published by the Committee and are thus laying broad and deep the foundations for fully informed and intelligent public opinion in respect to public utilities in the Illinois of the future.

Other States Should Adopt Workable Plans

The results attained in Illinois can be duplicated in any other state and in every other state—can be duplicated whenever and wherever the requisite effort is made. All over the country in conventions and meetings of one kind and another, the leaders in all branches of the utility industry are and long have been saying that we should "educate the public" as a means of getting the industry on a footing. This being so, we in Illinois sometimes wonder why the big utility interests, and particularly the national associations of utility interests, do not move faster toward putting the Illinois Plan into operation through out the country. The Illinois Plan may not be the only one or the best one that can be found, but it is A plan that works and it is the only plan that is producing observable results anywhere in this country. So we naturally ask: why not use it until somebody invents a better one?

After eighteen months of practical experience, we of the Illinois Committee on Public Utility Information believe as never before in educational publicity—in the kind which I have tried to describe and which we have tried to practice under the Illinois Plan. We believe it is getting results. If human experience counts for anything, these results are bound to be cumulative. Therefore, out of this experience we are developing a confidence that, by intelli-

gent publicity effort consistently and continuously employed, the public utility industry can be delivered from the dangers of demagogery and can be made as safe and immune from unfair political attack as the churches and public schools are.

Advising the Public of the True Cause of Power Interruption and so Gaining Their Co-operation

The British Columbia Electric Railway Company had a shut-down of some ten minutes on their light and power system and twenty minutes on their railway system, on December 20th, over their entire district, on both B.C. Electric lines and Western Power Company lines, which are tied in together, owing to the breaking of some insulators by stones thrown by small boys. This occurred at 2 o'clock in the afternoon while the streets were filled with Christmas shoppers. The short circuiting of high tension lines produced a surge on the other circuits and caused the interruption.

In order to explain the situation to the public the company took space in the newspapers, the advertisement being as below. They also offered \$100 reward for the arrest and conviction of the person, or persons, causing the damage.

Why the Power Went Off

THE British Columbia Electric Railway regrets the shutdown of electric power on its and the Western Canada Power Company's whole system yesterday afternoon.

The cause was the mischievous breaking of ten insulators on high tension poles in North Vancouver by boys, according to the evidence available.

As a result, light and power circuits were cut four or more minutes, depending upon the district, and railway lines up to twenty minutes.

Such wilful destruction of electrical apparatus on which the life of the community depends, is punishable under the criminal code, because the cessation of electric current for a moment is liable to cause death (in hospitals), injury to persons and loss and destruction of property.

We take this opportunity to acquaint the public with the circumstances surrounding this case, in order that they may co-operate in safeguarding the public service and preventing any recurrence of such criminal interference with the service on which the community relies.

British Columbia Electric Railway Company

"Service at Cost" Advocated in Winnipeg

Adoption of a policy of "service at cost" in connection with the Winnipeg Electric Railway is advocated in the Public Service News, official organ of the company. The suggested policy would take the railway out of the jurisdiction of the Public Utilities Commission and place it under

the control of a commission of five, composed of two representatives of the company, two from the City Council and an independent chairman.

The company is advocating this policy as a means of ending litigation with the city, conducting the road under the most favorable conditions to the public and company alike, and making the fare question one to be determined by the money the enterprise is able to earn.

The franchise expires in seven years and the company is urging an extension in order to finance necessary developments.

Mr. Dion Goes to New York

Mr. A. H. Dion, who has been general manager of the Moose Jaw Electric Railway Company since its organization, has resigned, as recently announced. We learn further that he leaves Moose Jaw to take up his residence in New York in the capacity of general manager of the Welding Accessories Corporation of New York, who are



Mr. A. H. Dion

engaged in the manufacture of electric welding equipment for all kinds of shop work. It is the plan of this company to expand as rapidly as possible the present scope of their business, which Mr. Dion's experience and recognized ability will enable him to carry through.

The Duncan Electrical Company, Limited, Montreal, have sent to each of their patrons a greeting card expressing their appreciation of the business of the past year and extending their best wishes for a bright and prosperous 1921.

Electric Railway Association Open to Municipal Systems

The annual meeting of the Canadian Electric Railway Association, which was recently announced as Jan. 17-18, will probably not be held until some days later. Representatives of all electric roads, both private and municipal, will be welcomed. This represents a change of policy on the part of this association, which heretofore has accepted membership from privately-owned railway systems only.

"We had extra blank sheets punched for use in estimating which could be easily torn out when everything is compiled

ELECTRICAL SPECIFICATIONS

Name

Date

Ch. by

Fig. by

Arch.

Building

	Outlets	Flush	SWITCHES		Base Plugs	Bells
			Snap	3-Way, F. 3-Way, S.		
Main Hall						
Verandah						
Parlor						
Sitting Room						
Library						
Dining Room						
Kitchen						
Pantry						
Cellar						
Upper Hall						
Bathroom						
Bedroom No. 1						
Bedroom No. 2						
Bedroom No. 3						
Bedroom No. 4						
Bedroom No. 5						
Bedroom No. 6						
Sewing Room						
Attic						

Form 1—A form for outlet specifications

ELECTRICAL ESTIMATE AND RECORD SHEET

Name

Date

Ch. by

Fig. by

Arch.

Building

AM'T	MATERIAL	PRICE	AM'T	MATERIAL	PRICE
	Wire			Brought Forward	
	Wire			Sq. Ft. Asbestos	
	Wire			Boards, Nails, Screws	
	Wire			Gas, Paste, Paint	
	Wire			Solder, Tape	
	Cable			Snap Switches	
				Sub. Bases	
	Loom			Flush Switches	
				Flush Plugs	
	Knobs			Surface Plugs	
	Tubes, 3"			Steel Wall Boxes	
	Tubes			Cartage, etc.	
	Tubes			Board	
	Conduit, 1/2"			Car Fare	
	Conduit			Inspection Fees	
	Conduit			Incidentals	
	Conduit and Covers				
	Conduit and Covers				
	Conduit and Covers				
	Conduit and Covers				
	Panel Boards				
	Panel Boards				
	Locknuts			Total Material Cost	
	Bushings			Labor	
	Fed'l Bushings			Labor	
	Service Box				
	Cutout Boxes			Total Cost Material and Labor	
	Cutouts			Cost of Operation	
	Fuse Plugs				
	Ground Clamps			Total Cost	
	Pipe Clamps			Profit %	
	Carried Forward			Price Submitted	

Form 2—An electrical estimate and record sheet

for estimate sheet, leaving everything right at your fingers' ends.

"If these are of any use to you, you are at liberty to use them. The writer applied for patents on these forms, but, according to our laws, they would not grant it."

[We print the last sentence merely to show that Mr. Grinyer must find these forms particularly effective or he would not think of patenting them.—Editor.]

When you have read this article and looked over Mr. Grinyer's estimate sheets, sit back a moment and ask yourself whether you couldn't make a suggestion by way of addition, reduction or improvement, in any way, that would help the good cause. Send us a copy of your own estimate sheet—if you have one. If you haven't, write and tell us "Why." Remember—this department belongs to you—to Canada's electrical contractors. Give it a boost.

Another View Point on Question Raised by Mr. Salisbury re the Electrical Contractor

Windsor, Ont.

Editor, Electrical News:

Re Mr. Salisbury's article in the Electrical News of Dec. 1st, the question of merchandising by electrical contractors. Mr. Salisbury hits the nail squarely on the head in saying that retail merchandising of electrical devices, supplies, etc., may be successfully carried on as an adjunct to the business of a well organized construction business, but that it is not advisable to inflict additional burden upon the poorly organized semi-successful contractor.

Regarding the advisability of the electrical manufacturer and jobber spending his time and money in an attempt to educate the contractor along business lines. I am not so certain. In this connection there keeps running in my mind the words of a few lines of a song sung (?) by Raymond Hitchcock several years since in one of his so-called musical comedies. The song was entitled "What's the Use." The lines referred to are as follows: "What's the use of giving good advice to people now, and fools won't take it anyhow."

Good results might be obtained by directing educational efforts at a number of contractors who may be classified as being in between the successfals mentioned by Mr. Salisbury and the fools who seem to think that they can defy all rules of success and still succeed.

This class of contractors usually is made up of mechanics of more than ordinary intelligence but lacking business education and judgment. The fact that he starts for himself denotes that he has ambition, but it is a regrettable fact that he often fails solely because his jobber did not occasionally have a man-to-man business talk with him. But after all it is our opinion that the jobber can perform the greatest service along these lines by holding contractors strictly to their credit limits and terms thus compelling the worth-while ones to apply good business methods and quickly eliminating the fools.

Yours truly,
A. E. Roach.

A Useful Appliance With Washing Machine

The cut shown here is that of the Penberthy electric washing machine drainer, for filling and draining tubs and pails. The drainer fits any standard threaded faucet. If the faucet is smooth the Penberthy faucet adapter "E" is used. When filling any receptacle with water, the swivel "A" is screwed on to the faucet or any water pipe. A piece of hose is attached to extension "B," and a plug "D" is furnished with this drainer so that it can be screwed into connection "C." This plug closes the drainer at the bottom and causes

the water to flow into the receptacle through "B." When desiring to empty the receptacle this plug "D" should be removed and a piece of hose attached and allowed to run wherever it is desired to discharge the water. If the water is to be discharged into the sink, however, no hose is necessary



on extension "C." The drainer is made of aluminum and will not rust. The manufacturers of this device are the Penberthy Injector Company, Detroit, Mich.

Mr. C. W. Henderson, Well Known to the Electrical Trade Goes with Taylor Stoker Co.

The Taylor Stoker Co., Ltd., which has been operating in the past from Toronto, has now opened an office at Montreal, which will be the headquarters of the company. This office will be in charge of Mr. C. W. Henderson, sales manager of the company. It will be remembered that some three years ago the Taylor Stoker Co. opened a factory in Galt for the manufacture of their products in Canada, and since that time have been supplying the Canadian market



with home-made goods. This latest move in opening the Montreal office is the first step in a larger development plan, in which offices will eventually be opened east and west in Halifax, Winnipeg, Calgary and Vancouver.

Mr. Henderson, the Canadian sales manager, is very widely known in Canadian power-house circles, as he has been with Canadian Westinghouse ever since its organization, covering the eastern district with Montreal as his headquarters. The company have an interesting little booklet for distribution entitled "The Taylor Stoker—What It Does—What It Is," which may be had on application to either the Toronto office or the Montreal office, which is situated at 416 Phillips Place, Montreal.

Are You Standardizing on These Symbols and Asking Your Architect to do the Same?

	Ceiling outlet; electric only. No. in center indicates No. of standard 50 watt electric lamps		Main or feeder run under floor concealed
	4/2 indicates 200 watt electric light capacity and 2 gas burners		Main or feeder run concealed under floor above
	Bracket outlet; electric only. Numeral in center indicates No. 50 watt electric lamps		Main or feeder run exposed
	Bracket outlet; combination 4/2 indicates 200 watt electric light capacity and 2 gas burners		Branch circuit run concealed under floor
	Wall or baseboard receptacle outlet. Numeral in center indicates No. of stand. 50 watt electric lamps		Branch circuit run concealed under floor above
	Floor outlet. Numeral in center indicates number of 50 watt electric lamps.		Branch circuit run exposed
	Outlet for outdoor standard or pedestal; electric only. Numeral indicates No. of 50 watt electric lamps		Pole line
	Outlet for outdoor standard or pedestal. Combination 6/6 indicates 300 watt electric light capacity lamps, 6 gas burners		Riser
	Special outlet for lighting, heating or power current as described in specifications		Telephone outlet; Private service
	Drop cord outlet		Telephone outlet; Public service
	One light outlet for lamp receptacle		Bell outlet
	Arc lamp outlet		Buzzer outlet
	Ceiling fan outlet		Push button outlet; Numeral indicates No. of pushes
	S. P. switch outlet...		Annunciator; Numeral indicates No. of points
	D. P. switch outlet...		Speaking tube
	3-way switch outlet...		Watchman clock outlet
	Automatic door switch outlet.....		Watchman station outlet
	Electrolite Switch Outlet.....		Master time clock outlet
	Meter outlet		Secondary time clock outlet
	Distribution panel		Door opener
	Junction or pull box		Special outlet; signal system as described in specifications
	Motor outlet: Numeral in center indicates horse power		Battery outlet
	Motor control outlet		
	Transformer		
	Circuit for clock, telephone, bell or other service run under floor concealed. Kind of service wanted ascertained by symbol to which line connects		
	Circuit for clock, telephone, bell or other service run under floor above, concealed. Kind of service wanted ascertained by symbol to which line connects		

NOTE: If other than standard 50 watt electric lamps capacity is desired specifications should describe capacity of lamp desired

SUGGESTIONS IN CONNECTION WITH STANDARD SYMBOLS FOR WIRING PLANS

It is important that ample space be allowed for the installation of mains, feeders, branches and distribution panels.

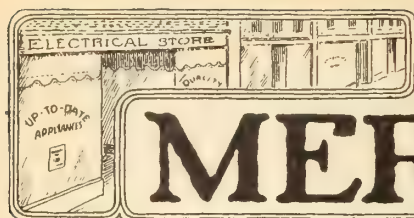
It is desirable that a key to the symbols used accompany all plans.

If mains, feeders, branches and distribution panels are shown on the plans it is desirable that they be designated by letters or numbers.

Heights of center of wall outlets from floor (unless otherwise specified)

Living rooms.....	5'-6"
Chambers.....	5'-0"
Offices.....	6'-0"
Corridors.....	6'-3"

Heights of Switches (unless otherwise specified) 4'-0"



BETTER MERCHANDISING



The Way is Clear for a Mighty Development in Retail Merchandising—1921 Promises to be Far the Biggest Year in History for the Electrical Industry — On the Threshold of a New Year*

We stand on the threshold of a New Year—a new opportunity. What you, Mr. Contractor-Dealer, make of it will be the sum total of what you are twelve months hence. There comes to my mind at the moment the words of an ancient sage who said "there is no labor in the grave, whither thou goest." It may not be pleasant to be reminded of one's ultimate end, but it is at least profitable if it has the effect of making one hurry to catch up with Opportunity and appropriate him—or her, if you like—as one's life companion. 'T would seem to be better to "hit the trail" in company with Opportunity than to "go it alone."

But, doubtless you ask, "What has that got to do with me?" Well, somehow there seems to us to be a connection between you as an electrical contractor-dealer and the grave question of "the end of all flesh." Three score years and ten is indeed none too long a period to round off a real, human life of usefulness and sociability, but when it comes to perfecting a first class electrical contractor-dealer, the time is indeed short.

It must not be inferred from this that the past, and particularly 1920, has been all "browsing." The electrical contractor-dealer has had his moments of "much ado"—although at times it has seemed as if it were "about nothing" when compared with the experiences some other kinds of dealers have had to make life interesting.

Taking it all in all, the average electrical contractor-dealer has grown some, but mostly because—like baby—he couldn't help it—it was inherent in the nature of things. But in due time natural growth stops and development from that stage on depends on the extent to which we cultivate what nature has provided. So it would seem to be in the field of electrical contracting and merchandising. There is a limit to the distance the electrical industry can go under its own momentum. Beyond that, its development is contingent upon the training and educating of the public in general and the individual in particular, to a realization of the utilitarian possibilities of electricity.

This, then, is the aforementioned connection which we see between the contractor-dealer and the warning of the sage, namely, that while spending his three score years and ten—and as many more as he can borrow—in being an industrious, sociable human, he should incidentally try to perfect in himself an efficient and "perpendicular" contractor-dealer, so that when time "pulls the switch" and he "goes out" he will be remembered by his association and by that section of the public whom he served, as a light that was dependable, and ever bright.

I particularly request that you ponder those words "his association," for alas, there are not a few electrical contractor-dealers who seem to think that the electrical industry is composed of some such firms as Messrs. I, Me and Myself," with sole rights to the business of electrical contracting and merchandising, and with full power to cut,

slash and otherwise disfigure prices, in their stampede for a living, which they never get and never will. It is such little Jonah's as these, with microscopic vision for picking out faults and weaknesses in their electrical brethren, that are rocking the boat of legitimate profits and steady growth. We venture to predict—although we are aware that prophets have no honor in their own country—that ere long these little fish will find themselves overboard altogether, and having a "whale of a time," while those who stick to the ship, and stand shoulder to shoulder, supporting their trade organization and trade journal, will find their efforts eventually crowned with success—practical success—in dollars and cents in their own pockets.

We hope, then, dear reader, that 1921 will find you "hiking" it in company with your electrical brethren, so that at its close your lamp may be burning brighter than ever and diffusing its light more evenly and intelligently upon the problems of your constituents and the aspirations and plans of your trade association.

Let There be Light

By A. J. Hahn

The eve of the new-born year often causes the mind to voyage backward into the realms of the bye gone days. Inscribed in the first pages of Genesis, the divine command, "Let There be Light," brought order out of chaos and harmony out of discord. Since that remote and distant era, man's progress may be measured in terms of the development of the light-sources.

The flaming torch, the anaemic, flickering candle, the odorous oil lamp, the sputtering gas flame and then the entrance into being in embryonic form of the greater illuminant—the carbon, incandescent electric globe. Briefly, the above stages of illuminating development may be taken as the yard-stick of human progress.

The old adage, "Familiarity breeds contempt," may be reckoned as the cause of the greater portion of the inefficiency in present lighting equipment. Not only from the industrial but also from the residential standpoint the above is applicable. Ignorance is quite frequently pleaded as the cause given as the alibi for poor conditions of lighting, but such an excuse is no longer legitimate. Trade journals, and magazines of almost every type have been harping both explicitly and implicitly on the manifold advantages of PROPER illumination.

The phrase "Proper Illumination" cannot be too strongly emphasized. It must ever be foremost in the mind of the one designing a given system of light distribution that too much light is equally as inefficient and injurious as too little.

After years of laborious laboratory experiment and gathering of data, tables have been formulated for practically every purpose giving a definite figure of requisite illumination.

The time has passed for the necessity of employing a lighting expert in order to give the average customer a proper system of lighting. Of course, there are exceptions to this rule. The manufacturers of all standard lighting equipment send out catalogues and pamphlets in which there are tables and formulae whereby any electrical man with average amount of experience in illumination should

*Contributed by E. C. D.

be able to work out a first class installation. The question then naturally arises, "Who should carry the banner of Better Illumination in the procession of civilization?" The answer is—The Electrical Contractor.

As in all other products of energy transformation, so too in light, there must of necessity be a basic unit or standard by which accurate measurements can be made. Thus we have the term "foot-candle." This unit is no longer the individual property of the physicist and scientist, but through a campaign of excellently conducted advertising, it has become a familiar phrase to the up-to-the-minute industrial manager and business man. A very compact, accurate, and extremely simple of operation foot-candle-meter has been placed on the market for general use; a few moments study of its directions and it can be operated with ease and facility. It is now up to the progressive contractor to make the most of his opportunities. The field in many localities is absolutely barren though virgin as the prairies of the great northwest territory. His is not only an opportunity for financial return but even more so...a direct service and benefit to humanity.

Let us examine a few of the more salient features of the arguments in favor of our subject—against which there are none that are valid. These arguments may be summarized under the five following general titles; Health, Labor Turn-over, Safety, Production and Spoilage.

It is well known that if the eye sight of the worker is not properly provided for and protected, eye strain soon results, with all its attendant nervous disorders and lowering of bodily efficiency. If the health of an employee is not first class, the results of his labors cannot be first class.

A purely natural inclination and tendency in human nature is to endeavor to surround one's self with the best possible environment; this is peculiarly true of the worker. In an establishment that is well lighted, cleanliness perforce accompanying, it is not surprising that the class of employees are not only better than those in the immediate vicinity, not having these same facilities, but that they have no desire to change their positions and "roam." The organization is kept intact and the labor turn-over is thus reduced to a minimum—a decidedly advantageous factor.

According to the data of several insurance companies, the majority of accidents occur on those days when there is the least natural day light. Also the greater number of industrial accidents occur in those parts of the plant in which the illumination is the poorest; about twenty five per cent. being readily avoidable with proper lighting. Not infrequently juries have held that improper lighting is contributory negligence in the case of an accident. It is needless to assert that safety and proper illumination go hand in hand.

Production is directly proportionate to the industrial's efficiency of lighting—the higher the lighting efficiency, the greater the production—whereas Spoilage is indirectly proportionate thereto. The haunting specters of every manufacturer are Spoilage and Seconds. Both can be minimized by proper lighting.

The argument is often advanced by the uniformed industrial manager that the "increased light bill" of a proper installation makes it an impractical proposition. The opposite is the real truth. It has been figured from a concrete example that the ratio of cost of lighting per man to wages is only 0.356 of one per cent. Most certainly a negligible factor when compared to the cost of volume production.

The Electrical Contractor is the agent in closest contact with the industrials; he is the logical medium by which proper illumination is to become a universal utility. Let us not stand idly by and wait until the state legislature, as several have done, make it obligatory by an industrial

lighting code, but rather blaze the trail with zealous endeavors.

Let us make the year 1921 the real Genesis of Proper Illumination, making our slogan, "THERE SHALL BE LIGHT."

"Organization" Has Taken a Strong Hold in Quebec Province—Contractor-Dealers Standing Together to Promote Interests and Welfare of Electrical Trade

The Electrical Contractor-Dealer Association of the Province of Quebec, with a Montreal section, was formally constituted at a meeting held in Montreal on December 20th. As our readers are aware, several months ago, a Contractor-Dealers' section of the Builders' Exchange was formed. Circumstances, however, arose which led to the resignation of a number of members of that section. Following this, meetings were held at which it was decided to re-organize on an entirely different basis and the result was the formation of the Electrical Contractor-Dealer Association of the Province of Quebec, together with an English section for Montreal.

At the meeting on December 20th, the following constitutions and by-laws were submitted by a provisional committee. It will be seen that these by-laws are divided into two parts, one dealing with the provincial association and the other dealing with the Montreal (English) section. Mr. J. M. Walkley presided. Following are the by-laws:

CONSTITUTION AND BY-LAWS OF ELECTRICAL CONTRACTOR-DEALER ASSOCIATION OF THE PROVINCE OF QUEBEC.

Article 1. Name.

This Association shall be known as the "Electrical Contractor-Dealer Association of the Province of Quebec."

Article 2. Purpose.

Sec. 1. The Association shall be to promote the interests and welfare of the Electrical Trade generally.

Sec. 2. To establish self-governing sections throughout the Province of Quebec.

Article 3. Membership.

Sec. 1. Those eligible for membership in this Association shall be reputable bona-fide Electrical Contractor-Dealers.

Sec. 2. All applications for membership to be investigated by a membership committee who will report their finding at a meeting before vote is taken on the application.

Article 4. Officers and Executive.

Sec. 1. The officers of this Association shall consist of a President, Vice-president, and Secretary-treasurer, who shall be elected at the annual meeting.

Sec. 2. There shall be an Executive Committee composed of five (5) members. The President and Vice-president shall be members of the Executive Committee ex-officio.

Sec. 3. A vacancy in the Executive shall be immediately filled by its remaining members from the general membership.

Sec. 4. The Executive has power as it deems necessary from time to time to appoint other officers and to define their duties, the terms of their appointments, and the termination of same.

Article 5. Meetings.

Sec. 1. The annual meeting of this Association shall be held on the first Monday in February of each year at 5 p.m.

Sec. 2. Special Meetings shall be called by the Secretary upon such instructions from the Executive Committee.

Article 6. Quorums and Notices of Meetings.

Sec. 1. A simple majority of the Executive shall constitute a quorum at its meetings.

Sec. 2. Seven days' notice of Annual Meetings must be given and three days' notice of Special Meetings.

Article 7. Amendments.

Sec. 1. Constitution and By-laws may only be amended at an Annual Meeting of the Members of this Association or at a special meeting called for this purpose, and only then by at least two-thirds of members present voting in favor of same.

Sec. 2. Notice of such amendment must be given in writing at least two weeks' previous to action being taken upon it.

CONSTITUTION AND BY-LAWS OF THE ENGLISH SECTION, MONTREAL, OF THE CONTRACTOR-DEALER ASSOCIATION OF THE PROVINCE OF QUEBEC.

Article 1. Name.

This Section shall be known as the "Electrical Contractor-Dealer Association of the Province of Quebec, English Section, Montreal."

Sec. 2. This Section shall be governed by the Constitution and By-laws of the Electrical Contractor-Dealer Association of the Province of Quebec together with such other By-laws as may be deemed requisite.

Article 2. Membership.

Sec. 1. Charter Members. The following are Charter members of this section:—

W. B. Shaw, of Montreal Electric Co., Limited.
E. Sayer, of Sayer Electric Company.
P. Lahee, of P. Lahee Company.
C. W. Gamble, of C. W. Gamble.
J. A. Anderson, of J. A. Anderson Company.
R. S. Muir, of R. S. Muir Electric Company.
H. A. Byron, of H. A. Byron.
C. E. MacGregor, of St. Lamberts.
F. J. Parsons, of McDonald & Willson Co., Limited.
E. I. Miller, of Lachine, Que.
E. J. Gunn, of Gunn Electric Co., Limited.
C. Thomson, of Fred Thomson Company, Limited.
C. E. Barrett, of Barrett Electric Company, Limited.
L. P. Mead, of Mead Electric Co., Limited.
M. R. Henry, of M. R. Henry.
J. M. Walkley, of Henry Morgan Co., Limited.
H. Vincent, of Vincent & Say Electric Co.

Sec. 2. All applications for membership to be investigated by a Membership Committee who will report their finding at a meeting before vote is taken on the application.

Sec. 3. Application for membership shall be read at the first meeting of this section, following its receipt by the Secretary, and voted on at the next regular meeting.

Sec. 4. Majority of votes of members present is necessary for election.

Sec. 5. Any member in arrears shall not have the right to vote.

Article 3. Officers and Executive.

Sec. 1. The Officers of this Section shall consist of a President, Vice-president and Secretary-Treasurer and an Executive Committee consisting of the above-named officers and five additional members, all of whom shall be elected at the Annual Meeting and hold office until the succeeding one.

Sec. 2. A vacancy in the Executive shall be immediately filled by its remaining members from the general membership.

Sec. 3. The Executive has power as it deems necessary from time to time to appoint other officers and to define their duties, the terms of their appointments and the termination of same.

Article 4. Finance.

The fees of this Section shall be Five Dollars (\$5.00 per annum, payable in advance.

Article 5. Meetings.

Sec. 1. The Annual Meeting of this Section shall be held on the first Monday in December of each year at 5 p.m.

Sec. 2. Regular meetings shall be held on the first and third Mondays of each month.

Sec. 3. Special meetings shall be called by the Secretary on receipt of a requisition stating reasons signed by five members in good standing.

Article 6. Quorums and Notices of Meetings.

Sec. 1. One-quarter of the members in good standing shall constitute a quorum at any meeting of this Section.

Sec. 2. A simple majority of the executive shall constitute a quorum at its meetings.

Sec. 3. Seven days' notice of annual meetings must be given and three days' of special meetings.

Article 7. Amendments.

Sec. 1. Constitution and By-laws may be amended only at an Annual Meeting of the members of this Section, or at a Special Meeting called for this purpose, and only then by at least two-thirds of members present voting in favor of same.

Sec. 2. Notice of such amendment must be given in writing at least two weeks' previous to action being taken upon it.

The constitutions and by-laws were the subjects of considerable discussion, in which Messrs. C. Thomson, F. J. Parsons, W. B. Shaw, J. A. Anderson, C. E. Barrett, E. J. Gunn and R. S. Muir took part.

The main points at issue were as to whether it was advisable to form a Provincial Association with a Montreal section or whether it would be advisable to form a Montreal Association in affiliation with the Electrical Co-operative Association of the Province of Quebec. Various arguments, pro and con, were advanced from the different points of view, all agreeing, however that it was of the utmost importance that the Association should be allied with the Electrical Co-operative Association of the Province of Quebec. Eventually, the constitutions and by-laws as submitted, were passed.

The following were elected officers of the Association: Mr. J. M. Walkley, president; Mr. J. A. Anderson, vice-president; Mr. A. F. Shaw, secretary-treasurer.

Executive Committee:—Mr. E. J. Gunn, Mr. C. Thomson, Mr. F. J. Parsons, Mr. W. B. Shaw, Mr. L. P. Mead.

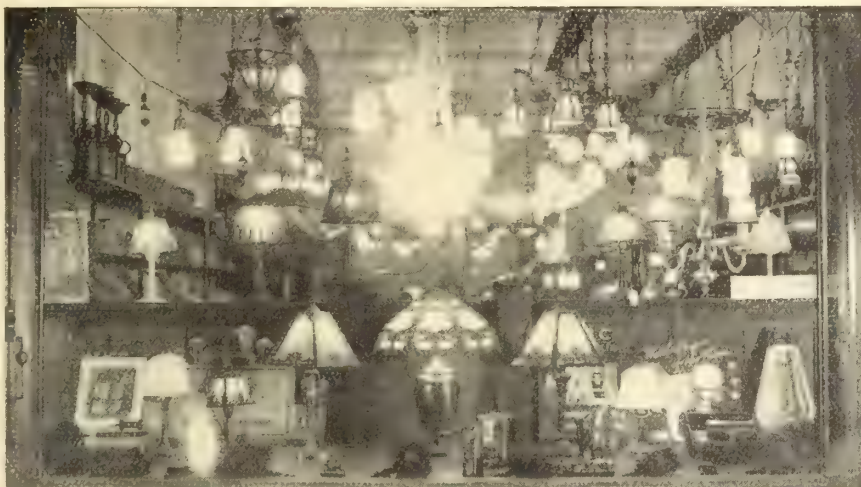
Messrs. W. B. Shaw, J. M. Walkley and F. J. Parsons were appointed as representatives of the Association to the Electrical Co-operative Association of the Province of Quebec.

During the evening Mr. J. A. Mochon, secretary of the Electrical Co-operative Association, gave a brief outline of the objects of that Association, pointing out its value not only to the contractor-dealers, but also to every section of the electrical industry.

It was stated that the French Section of the Association of Electrical Contractors had now about fifty members and had joined up with the Electrical Co-operative Association of the Province of Quebec. The following are the officers of the French section:—

Mr. N. Simoneau, president; Mr. Wm. Rochon, vice-president; Mr. L. Marcou, secretary; Mr. J. A. St. Amour, treasurer.

Directors—Messrs. P. E. Boissonneault, E. Mauné, Q. Tardiff, J. A. Roy, W. Roy, J. L. Tremblay.



The photo on the left portrays the Christmas window display of Mr. N. McLeod, an electrical dealer at 808 Danforth Ave., Toronto. The window display is somewhat over-shadowed in the picture by the fixtures within the store. As a holiday display this must have been a good business getter.

One of the best windows seen during the present season is that of the Toronto Electric Light Co. A great variety of suggestions is shown here with a minimum effect of over-crowding. Everything, too, has a Christmassy look.



The Central Electric Supply Co. used a cleverly placed mirror to illustrate the operations of their washing machine. The rest of the window was in keeping and though not a special holiday trim put the message across just the same. The company name would be just as effective perhaps if it were placed at the side of the window and the attendant advantages are evident.

How to Make Your Fan Work in Winter

You electric fan is probably accumulating dirt in the storeroom at this season of the year. Here are a few ways it can pay a return on the investment in the winter:

1. Any steam radiator will deliver two to three times as much heat to a room when an electric fan is blowing on its coils. Try it yourself.
2. A fan will force more hot air through a hot-air register, warming chronic "cold rooms."
3. A fan under the furnace will increase its draft.
4. Frosted show windows are cleared and kept clear by a fan.
5. Clothes hung up to dry indoors are more quickly dried by a fan.
6. Vegetables are readily dried in trays by means of a fan.

Blue Bird Branches in West

Mr. R. J. Dinwoodie, western manager for the Blue-Bird Corporation, Ltd., announces that his company will open a warehouse and western sales office in Winnipeg. He also states that branch warehouses will be opened in Calgary, Saskatoon and Vancouver. Hitherto the company's representatives were obliged to cover a large territory extending from Halifax, N. S. to Victoria, B. C. The opening of the western offices will eliminate this feature and should be of interest to western dealers as it will assure them prompt delivery and a better and more efficient service.

An Effective Montreal Window Display

One of the finest Christmas window displays of Montreal is that of the Sayer Electric Company, a photograph of which is reproduced herewith. No expense has been spared in decorating the window and it has proved a great drawing card.

On the left, a Thor electrical washing machine is shown, together with desk and table lamps. In the centre of the window electrical toys of all descriptions are shown to advantage. Sales helps, in the way of cards, are attractively arranged.

The right side of the window is devoted solely to heat-

ing and cooking appliances, also vacuum cleaners. This window display is set off to great advantage by an attractive background. The decorations are very simple, consisting of holly and evergreen. As soon as it is dusk the window is illuminated. This proves a great attraction to the passers-by.

Here's a Good Hunch

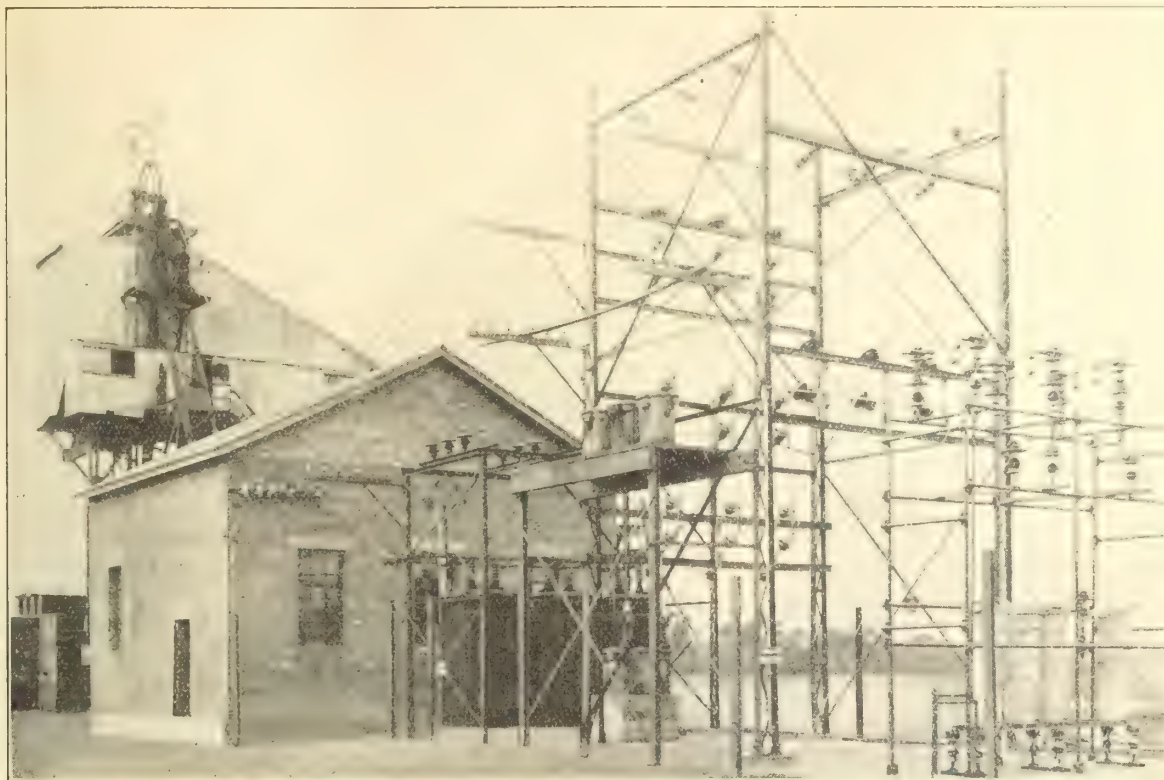
Going into the attractive store of the Morrow Electric Company, in Buffalo, N. Y., the other day, we were particularly impressed by the mahogany background in the closed-in window. We spoke about it, and Mr. Morrow let us into the secret. It wasn't wood at all, just wall-board, panelled and painted to look like the real thing, at a very small cost, and it would take an expert to tell the difference from the outside. Any carpenter can do it if you haven't time yourself.—Edison Sales Builder.

Fans for Profit

An interesting and attractive illustrated booklet has been published by The Robbins & Myers Company, Springfield, Ohio, entitled, "Putting Your Fans on the Profit Side of the Counter." The booklet opens with the subject of turnover, pointing out that it is the most important factor in determining the net profit of the retailer, that turnover is dependent on quality and that quality is one of the main features in R. & M. fans. Within the booklet are contained a number of small pasted-in pamphlets showing the different uses to which electric fans can be put in the home, office, factory etc., with details and specifications and views of the various parts of the motor. A printed list of advertising material which will be supplied to dealers on request is also given; it includes folders, mailing booklets, lantern slides, electros or mats for local newspaper advertising. This material is furnished free, transportation prepaid to dealers who stock R. & M. fans. An order blank is attached at the back of the booklet for this purpose so that the dealer can fill it out and mail it to the company. This company is planning an advertising campaign that will include 60 leading publications with a combined circulation of over 12,500,000 per issue. This circulation, they claim, represents approximately 50,000,000 readers.



Very handsome holiday window display of Sayer Electric Co., Montreal



33000/2300 V. 2000 Kv.a. station supplying power to coal mine

Selling Central Station Power to Coal Mines

By H. W. Young*

During the past three years there has been a great increase in the number of coal mines using central station power. Some transmission companies have built generating stations to supply power exclusively to coal mines; others have materially increased their distribution systems to new mining districts. These extensions in connection with the low cost out-door sub-station make it possible to economically supply power for both small and large mines.

Central stations in many instances have not fully developed the coal mining load, feeling that it was often a difficult problem to convince the mine operator that power could be purchased at less cost than it could be generated at the mine. At old mines having their own plants the central station opportunity will come when it is found necessary to expand and enlarge the capacity. This is a good place to put in a motor-generator set running it in parallel with the coal mine plant. The mine owner will quickly see that with auxiliary central station power he can shut down his generating plant on days when he is not mining coal. Other savings can be effected by banking fires and laying off all labor during the night shift.

By starting in this way the old mines can be gradually won over and will eventually take more or all power from the transmission lines. In many cases it can be pointed out that further coal development is possible than would have been considered if the mine owner had to enlarge or rebuild the steam plant.

Very little trouble will be encountered by the central station in selling power to new mines as coal operators now realize that isolated plants cost money, depreciation costs run into considerable figures and by securing current through the out-door sub-station his power problems can be transferred to an organization best equipped to handle them. From a central station standpoint the coal mining load is

a good proposition for while the average number of working days may be approximately 240 per year, there is a more or less constant power demand. While some mines may be closed as far as mining or hoisting coal is concerned, they have to keep the pumps running, also requiring a certain amount of small power load about the mine each day and every hour of the day.

A typical steel tower outdoor 33000/2300 volt 2000 kv.a. substation supplying central station power to a coal mine is shown in the accompanying illustration.

No Place Like Home—If It's Electric

An interesting and attractive twelve-page booklet entitled, "Be It Ever So Humble," is published by Messrs. Beattie-McIntyre, Limited, 72 Victoria Street, Toronto, "inscribed to the man who is about to build." The first few pages are given over to a review of the march of progress since the days when John Howard Payne wrote "Home, Sweet Home," and when lighting was done by "Lanthorns," by the tallow dip or the crudest of oil lamps. This is followed by photographs of some of the larger residences electrically equipped by the Beattie-McIntyre firm. The rest of the booklet is given over to full-page drawings of the various rooms in a model house, showing in great detail the proper placing of outlets and receptacles, accompanied by a very complete list of electrical appliances used in each room. The work is prepared in a very thorough manner, worthy of the extensive experience which Messrs. Beattie-McIntyre have had in the wiring of better class homes and business structures.

The Delta-Star Electric Company, Chicago, Ill., are distributing a new leaflet describing their 40,000-pound testing equipment for mechanical testing insulators, bus supports and switches which will be subject to heavy mechanical stress.

*President Delta-Star Electric Company, Chicago, Ill.

Airplane View of Diamond State Fibre Co's. Plant

One of the most interesting commercial uses of the aeroplane has been the taking of photographs of large industrial plants. The above picture is the first aeroplane photograph ever taken of a vulcanized fibre plant. The plant is the Bridgeport plant of the Diamond State Fibre Company. This is the largest of the eight plants of the company, who are the largest fibre manufacturers in the world. The photographer had an exceptionally clear day and made a remarkable photograph. There was no retouching on this picture.

The Diamond State Fibre Company's plant is located at Bridgeport, Pa., on the west bank of the Schuylkill River about 20 miles northwest of Philadelphia. On one side of the plant is the main line of the Philadelphia & Reading and the Schuylkill River on the other. Every process in the fibre industry from the raw material stage to the finished product is made in this plant. Over thirty acres of land with thirty buildings, containing 400,000 square feet of floor space are occupied. The buildings are of modern fire-proof construction, and contain the latest and most up-to-date equipment. A private telegraph station with both Western Union and Postal Telegraph connections is maintained. At the present time an experimental wireless station is being installed.

This plant furnishes employment for over 850 people. A large self-service lunch room is maintained for the employees and group insurance is carried for all employees who have been with the company three months or more. The employees also have their own baseball and basket ball teams. Additions to the plant are constantly being made in order to keep up with the ever-increasing demand for the products of this company. In the lower left hand corner

of the photograph will be seen the foundations for a large paper mill which will soon be turning out Diamond-F Protective Papers.

Sales offices of this Company are located in all the principal cities of the world and the increasing production of Diamond Fibre and Diamond Fibre Products causes an immense consumption of raw materials and supplies.

Large X-Ray Contract

The National X-Ray Reflector Company, Chicago, have closed a contract for installing their X-Ray indirect lighting equipment in the Field Museum of Natural History, Chicago. The installation comprises 396 indirect fixtures. The low wattage of seven-tenths watt per square foot is being provided as the walls and ceilings are white with little decoration.

Personals

Mr. W. L. Griffin, advertising manager for the National X-Ray Reflector Co., was elected to the board of directors, Advertising Men's Post of the American Legion, at their annual election Monday, December 6, 1920.

Mr. Frank Thornton, Jr., chief engineer of the Westinghouse Electric Products Company, has been appointed manager of the Electric Heating Engineering Department of the Westinghouse Electric & Manufacturing Company.

Hearings on the application of the Bell Telephone Co. for increased rates will be resumed before the Board of Railway Commissioners in Ottawa on January 5th.

"When we hear of a man cutting down on his advertising" said a bank president recently, "we cut down on his credit."



Airplane view of Bridgeport plant of Diamond State Fibre Co

What is Newest in Electrical Equipment?

It is claimed by the manufacturers of a new type of fixture that electric lights may now be installed as quickly and easily as pictures are hung. This advance in the science of electrical illumination has been made possible through an invention of Cantelo White, a New York lighting expert. Not only may fixtures be put up easily, but they may be shifted with equal facility from one part of a wall or ceiling to another to suit the need or taste of the user.

The newly invented device, which is being developed by the Electric Outlet Company of New York City, consists of a new style outlet and a new plug with curved blades, which supports the fixture and makes the proper electrical connection at the same time. Thus an electric light fixture cannot rightly be called a "fixture" under this new plan of installation. The new outlets may be placed in either walls or ceilings wherever a light could possibly be used. Generally more outlets will be put in than ordinary lighting conditions require. When once installed they are ready for service and a building thus equipped can be passed by inspectors and underwriters even if none of the light fixtures are in place.

The wall outlet is marked by a neat brass plate with a rounded triangular blade centre, which looks somewhat like the already familiar baseboard outlet. It will also accommodate the standard parallel blade plugs now commonly used with cord connections. An inconspicuous brass plate marks the ceiling outlet. This installation of electric exits finishes the work of the electrical contractor. It will not be necessary to call him in to put up, take down, or shift a light, except in the case of the heavier and more elaborate fixtures.

The new plug is attached to the light itself. When it is



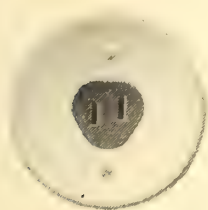
Curved lugs of plug, in this position, slip into outlet. Plug attached by cord to fixture which hangs on vertical projection shown.



Wall Outlet

The new plug is attached to the light itself. When it is thrust into the new outlet the curved blades point upwards and are capable of holding the heaviest fixture.

For the more elaborate wall fixtures the plug is not rigidly attached to the fixtures. In this case the wall fixture is hooked over the plug after it has been inserted in the wall receptacle. In wiring the plug to the wall light, slack enough is left to allow the fixture to be readily hooked and unhooked with the plug in position.



Ceiling Outlet



Ceiling Plug

The blades of the ceiling plug curve outward like the business ends of an anchor, forming the connection and sustaining the heaviest chandelier.

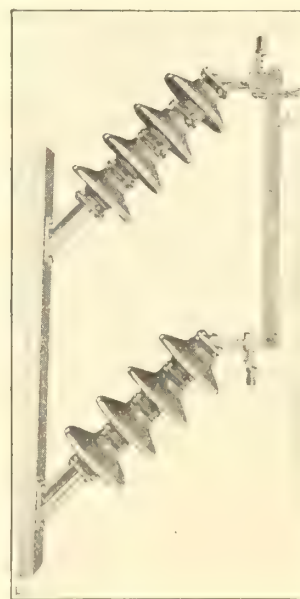
To shift a fixture, all the user needs to do is to lift the light off the outlet, as if he were taking his hat off a hook. He can hang it in another outlet in a different part of the wall or hang it up in another room. If he desires to change the style of his fixture at any time, he can take off the old ones and put the new ones in place as easily as he would plug in a percolator or other appliance.

For hospitals or similar institutions, as in the home, this new device is especially helpful. It eliminates the inconvenience of fixed lights, the nuisance of lengthy electric cords, the trouble and expense of wiring when lights are moved from one place to another, and it facilitates the quick and easy shifting of light from one side or corner of a room to another to suit the need of a patient, doctor or nurse.

We are advised the device will be manufactured by a number of companies and will be on the market early in 1921.

Unit Type 66,000-Volt Disconnecting Switch

The disconnecting switch illustrated is of the Unit Type design, with the insulator supports assembled from the interchangeable unit. In case it becomes necessary to replace a unit this can be easily accomplished by removing four bolts.

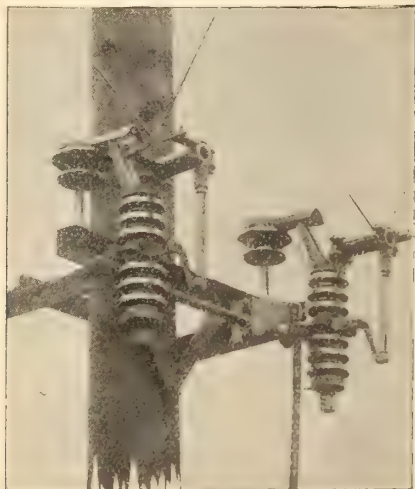


The blade is of the truss form with flaring guides to insure proper contact with the steel jaws. If desired, the switches can be assembled for inverted or over-head mounting by simply removing the interchangeable fittings and remounting them as desired on the steel channel base. The manufacturers of this unit type switch are the Delta-Star Electric Co. of Chicago, Ill.

According to a report just submitted by the Commissioners the income of the Toronto Hydro-electric System for the period ending September 30th was \$2,236,550.20, of which \$951,843.57 was brought forward to meet fixed charges. Of the income of the system \$878,118 was for ordinary lighting, \$1,016,691.71 for power, \$219,531.85 for street lighting and \$22,198.92 from the exhibition. The expense of operation, cost of management, etc., was \$673,713.79, and the cost of current \$610,992.84. The assets of the system amount to \$12,637,009.62 with \$538,601 available for depreciation.

Compact Switching Equipment for Farm Line Service

For the control and protection of small outdoor distributing transformer installations which supply energy to farm extension lines and the like, the Westinghouse Electric & Manufacturing Company has placed upon the market the type FL switch, which consists of a combined fuse, lighting arrester and disconnecting switch. The equipment may be mounted near the top of a line pole so that it is operated from the ground by means of an operating handle. This switch



is adapted for applications requiring 24 hour service, but it is also suitable for applications such as grain elevators, mines, quarries, brickyards, etc., which are only operated periodically. This combination switching equipment is of rugged construction and all metal parts exposed to the weather have a durable galvanized finish. The pillar type insulators are a one piece porcelain.

These switches are made in both single phase and three phase sizes for 2500, 6600 and 13,200 volt service. They are intended for applications up to approximately 50 kva. rating.

A Pathetic Wail

The following answer has been received in reply to a request for a cheque to cover an account:

"For the following reasons I am unable to send you the cheque asked for:

"I have been held up, held down, sandbagged, walked on, sat on, flattened out and squeezed, first by the Canadian Government for Federal War Tax, Excess Profits Tax, Merchants License and Auto Tax, Victory Loan Bonds, Thrift, Capital Stock Tax, and every society and organization that the inventive mind of man can invent to extract what I may or not possess.

"From the Society of John the Baptist, the G. W. V. the Womens Relief, the Navy League, the Red Cross, the Purple Cross, the Black Cross, the Double Cross, the Childrens' Home, the Dorcas Society, the Y.M.C.A., the Y.W.C.A., the Boy Scouts, the Jewish Relief, the Belgian Relief, and every hospital in town.

"The Government has so governed my business that I don't know who owns it. I am inspected, suspected, examined, re-examined, informed, required and commanded, so I don't know who I am, where I am, and why I am here, all I know is I am supposed to be an inexhaustible supply of money for every known need of the human race, and because I will not sell all I have and go out and beg, borrow or steal money to give away, I have been cussed, discussed, boycotted, talked to, talked about, held up, robbed and nearly ruined, and the only reason I am clinging to life is to see what in Hell is coming next."

Electric Rivet Heater

Industrial progress has created a demand for an efficient, portable self-contained rivet heater, and it is to meet this demand that the Canadian General Electric Company of Schenectady, N.Y., has developed the G-E electric rivet heater as shown here. The objections to the old heating methods with the attendant expense of handling fuels or installation and maintenance of piping, together with the problem of disposing of waste gases, cinder and dust are eliminated in this flexible electric rivet heater. The operation of the heater consists of passing the high power secondary current at very low voltage through two rivets in series, thus obtaining uniformity of heat in the rivet. Rivets are removed alternately,



the remaining rivet being subjected to a brief "soaking" while a cold rivet is being inserted. No adjustment is required for different lengths of rivets. Various heats are obtained from a four-point dial switch enclosed in a steel box. When desiring to stop heating, it is not necessary to open line switch, simply remove one rivet. The frame of the heater is made of angle iron and the jaws are operated by foot pedals equipped with a stop for preventing short-circuiting of jaws when rivet is removed. The machine weighs approximately 500 lbs., and has a maximum production capacity of 800 rivets per hour. The Canadian General Electric Company get out an attractive explanatory folder, giving approximate maximum production per hour for various sizes of rivets, together with other interesting information.

Mine Locomotive Headlights

"Mine Locomotive Headlights" is the subject of Bulletin 7-A-C-1, which describes the new mine locomotive headlights for 23 to 94 watt lamps recently placed upon the market by the Westinghouse Electric & Manufacturing Company, George Cutter Works, South Bend, Indiana. Among the features which are discussed in this bulletin are rugged cast iron construction, gas proof cover, spring suspension effective in all directions, and resistance mounted in cast-iron housing.

What Percentage of Salesmen—or
Saleswomen—Realize the Value of

Studying the Customer

More Sales are Lost by Poor Salesmanship Than
Through Lack of Money

"Is there anything I can show you?" Thus queried the saleslady as she approached the young woman and her escort.

"We were just looking at the electric toasters," replied the fair one. "What is the idea of having these side pieces on them?" she asked.

"These are for holding the toast firmly while it is toasting, so that it will not fall off. Sometimes, too, if the bread is thinly cut, it has a tendency to curl when it gets hot," replied the attendant.

"Oh, I see" continued the lady. "That's rather a good idea, although I should imagine they would be rather in the way if one were in a hurry.

"What do you think?" This was addressed to her companion who had hitherto remained in respectful silence. He seemed rather nonplussed at being so suddenly called upon to express an opinion and mumbled something unintelligible, which the lady seemed to take as favorable to the opinion she had expressed.

"I see you have also the ones without the sides," she continued.

"Yes, we carry both lines, they are both good toasters," replied the saleslady.

"What is the price of the one without the sides?"

"Four dollars and seventy-five cents."

"And the other?"

"Six dollars and fifty cents."

"We have used the one with the sides in our home for over a year," said the attendant, "and we have found it very satisfactory."

"I suppose its just a matter of the way one has been accustomed to doing it," replied the lady. "I have been accustomed to the plain toaster."

"Oh, they are both good toasters," continued the saleslady. "But, of course, these little improvements have been carefully thought out by the manufacturer with a view to greater efficiency and convenience. It has been found that sometimes the slope on the ordinary toaster is not enough to hold the toast in position when it gets hot and begins to curl, and for this reason the sides were thought of."

As the customer seemed rather slow to make up her mind the saleslady moved to attend an-

other customer who had entered the store, leaving the lady and her companion still discussing the two styles of toaster.

Now this saleslady did very well up to a certain point, but she could have done better. Her approach was good. Her explanation of the reason for the sides on the toaster was also good. As the conversation advanced, however, it should have become evident to the saleslady that her customer was just slightly biased in favor of the less expensive toaster. The customer stated that she was "accustomed to the plain toaster." The reply of the attendant pointing out the "efficiency and convenience" idea was good, but she should then have taken a different tack, and certainly not have moved away to serve someone else just when she was beginning to make headway. The fact that the lady and her companion did not move away after the attendant had left them showed they were still interested. The real salesman never leaves his customer so long as that customer shows the slightest sign of interest.

It was evident from what the lady said that she already had a toaster. Here was a clue. Either she was planning to give someone a Christmas gift of a toaster, or else, who knows, the gentleman at her side had promised to buy her a new toaster for Christmas. The attendant could have asked in a polite way if the toaster was for a Christmas gift, and in this way have obtained something to work on. She could have brought out the popularity of the toaster with the sides over the plain model by a reference to the greater number of sales they had made of the one over the other. She could also have pointed out the superiority of the nickel plating on the one over the other, and by a little practical demonstration could have shown how easily the sides operated when inserting or removing the bread, and in this way gone a long way towards overcoming the objection in the customer's mind. If necessary, the lady's companion could have been appealed to by the saleslady for an expression of opinion, and in this way a new point of view might have been created. The true salesman is flexible, quick to perceive points of harmony and difference, and is ever appealing to human nature to aid him in serving his fellow creatures by enlightening them as to how they can best serve themselves.

Current News and Notes

Agassiz, B.C.

Agassiz is now a modern electrically equipped town. The installation work has just been completed by the Chilliwack Electric Company as representatives of the Delco Light Company. More than a mile of pole line has been constructed and a plant installed capable of producing 12,000 watts at peak load.

Alexandria, Ont.

Mr. Roy Macdonald, a previous resident of Alexandria, who has been residing in Winnipeg, Man., for some years, has returned to Alexandria where he has opened an electric store and contracting business. He is being kept busy with wiring contracts in anticipation of the delivery of hydro-electric power to the town about February 1st. The Public Utilities Commission of Alexandria are busy preparing for hydro power. It is expected that after all the local industrial plants have been served there will be plenty of power left for any newcomers.

Blyth, Ont.

Mr. W. J. Nediger, Clinton, Ont., has been awarded the contract for electrical work on \$12,000 Memorial Hall being erected at Blyth by the Citizens' Committee.

Brantford, Ont.

Announcement has been made by Chairman Wedlake of the Hydro-electric Commission at Brantford that plans are being prepared to double the system next year at a cost of \$75,000. The plant now in use was constructed for 650 customers, and there are now 4,000 domestic customers, and in addition power users get 2,600 horse-power. With the Chippawa power available soon, all apparatus and transformers will need duplication, and this work is expected to be under way sometime during 1921. The power house on Greenwich Street will be extended to take care of the new equipment.

Among other questions to be submitted to the citizens of Brantford for their expression of opinion at the Municipal elections is one dealing with the question of Sunday street cars.

Edmonton, Alta.

Mr. H. R. Pearse, general superintendent of Alberta government telephones, has resigned. It is reported that he will vacate the post next March to become chief engineer for the New Brunswick Telephone Company at St. John.

Fredericton, N.B.

The Maritime Electric Company are installing an addition to their power plant. This includes a generator of 375 kv.a. capacity, two bearing couple, two phase, 60 cycle, 750 r.p.m., with 6 kw. exciter and control panel. This generator and pump is being supplied by the Wheeler Condenser and Engineering Company. This addition will add approximately fifty per cent. to the capacity of the present plant.

Galt, Ont.

Since the introduction of the Hydro in Galt in 1911, this past year has been the best in the history of the department. A profit of \$17,000 on the year's business was reported by Manager W. H. Fairchild. Galt has now invested in its hydro-electric system \$357,986.02, against which there is a debenture issue of \$184,477.49 with sinking fund of \$55,000. Depreciation reserve fund is now \$69,230, and net surplus to the credit of the department is \$104,000. During the past year

210 new customers were taken on. It is planned to erect a new Utilities Building with practically new electrical equipment, during 1921.

London, Ont.

The Ontario Power Commission has approved plans for a Hydro sub-station in East London to cost \$35,000, to accommodate the new industrial area that the city has established there. The Public Utilities Commission will begin work on the station at once. Filtration equipment will also be installed at the Horton Street pumping station at a cost of \$55,000. This equipment is designed to remove traces of sulphur, etc. from a portion of the water supply secured from the Beck artesian wells.

Maxville, Ont.

Mr. J. S. Livingston moved to Maxville recently from Wellington, Ont. He is busily engaged on wiring contracts for the residents of the town in anticipation of hydro-electric power which is expected to be turned on about January 1st.

Moncton, N.B.

Edgar T. LeBlanc, electrical contractor, fixtures and supplies, Moncton, N.B., recently moved from St. George Street to new premises at 11 Church Street, where he will stock an up-to-date line of fixtures and supplies.

Montreal, Que.

In our issue of December 15th, we announced that Messrs. Hart and Buchanan, 759 St. Antoine Street, Montreal, had been awarded the contract for electrical work on \$40,000 alterations to the factory of National Drug & Chemical Co., Montreal. This should have read Messrs. Vincent & Say Electric Company, 351 Union Avenue.

The Quebec Gazette reports the incorporation of "La Compagnie de Telephone d'Yamaska, Limitee," with head office at Saint-Guillaume-d'Upton, in the district of Richelieu for the purpose of taking over the telephone line and its accessories belonging to "Le Telephone Yamaska" and extend this line to other counties. The company is capitalized at \$45,000.

Mr. E. Robillard, 1346 St. Joseph Street, Verdun has been awarded the contract for electrical work on \$100,000 department store being erected on Wellington Street, Verdun for Mr. J. A. Gagnon.

The Canada Gazette announces the incorporation of the Canadian Electrical Supply Company, Limited, with head office at Montreal, for the purpose of manufacturing and dealing in electricity and electric motive power. The company is capitalized for \$100,000.

A statement has been issued by Nesbitt, Thompson & Co., Montreal to the effect that over 80 per cent. of the people of the United States served by street railways are now paying higher fares. In Canada the highest street car fare is 7 cents, or four tickets for 25 cents, with the exception of three municipal street car lines in Western Canada, which are charging a 10-cent fare. In the United States the higher fares are effective in the following number of cities: Six cents, 134 cities; seven cents, 211; eight cents, 68; nine cents, 4; ten cents, 110.

The contract for installing the lighting system and the motors in the new factory of Bovril, Limited, at the corner

CADMIUM-COPPER WIRE

— THE WIRE FOR WEAR —

During the War the whole of our output of Cadmium-Copper Wire was taken by the European Governments for War purposes.

We are now once more in a position to supply the requirements of our customers for this well-known wire in all sizes for Trolley Wire, Transmission Lines, Telegraph Wire, &c.

CONDUCTIVITY 7% TO 10% LESS THAN HARD DRAWN COPPER
TENSILE STRENGTH 10% TO 75% GREATER
According to size of wire.

As an Asset Cadmium-Copper has the same Scrap Value as Electrolytic Copper.

TROLLEY WIRE

is manufactured by us in

ROUND,
GROOVED,
NON-FOULING,
SPECIAL SECTIONS

and has been supplied by us to the principal Street Railway Systems of the Dominion. The following Report was received by us from the Superintendent of one of the largest systems:—

“On May 8th, 1919, we strung the outside curve with a sample of this wire. The opposite curve in the same direction had been strung with ordinary trolley wire a very short time previous.

“On December 21st both curves were measured with a micrometer. This would give each curve 228 days' service, and taking 365 mils as the diameter of a 2/0 wire, we found that the maximum wear at any point on the cadmium wire was 20 mils, while the maximum wear at any one point on the ordinary copper wire was 60 mils. The average wear on the cadmium wire was 5 mils, and on the copper wire about 20 mils.

“At the above rate of wear the cadmium curve should last between two and three times longer than the other curve.”

SERVICE COUNTS

Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889

Head Office and Factories - MONTREAL

of Van Horne and Park Avenue, Montreal, is in the hands of Messrs. Collyer and Brock, who have the work well along.

Nelson, B. C.

For the past eight months the Nelson street railway has been operating on a four-cent fare, during which time 45,000 more passengers were carried than for the same period the previous year, with a gain of \$1,000 in receipts. The Town Council has ordered a return to the five-cent fare to see if the traffic will be affected.

Powell River, B. C.

Contract will be let for electrical work on one hundred bungalows to be erected at Powell River for workmen's residences, at an estimated cost of \$350,000. The work is being done for the Powell River Company, Ltd., and the architect will be the company's own engineer.

Regina, Sask.

The question of the one-man street car is again to be submitted to the ratepayers of Regina at the next annual municipal election, it being held by the Regina City Council that when last submitted a representative vote was not polled and the value of one-man cars was not understood. Under the Saskatchewan Railway Act, Section 237, the council cannot even experiment with a car of this type without the ratification of the majority of the voters. It is estimated that over forty thousand dollars per annum could be saved in operating expenses on the Regina street railway by the adoption of the one-man system.

Saskatoon, Sask.

The Wheaton Electric Company, Saskatoon, have been awarded the contract for the following equipment in connection with the Normal School to be built at Saskatoon: 24 single burner hot plates, 660 watt capacity; 1 domestic electric range; telephone system for 12 stations; automatic time system with master clock and 15 secondary clocks; bell system and fire alarm system.

Sydney, N.S.

The McKay Electric Company, Sydney, have been awarded the contract for electrical work on \$75,000 bank being erected on Charlotte Street for the Canadian Bank of Commerce.

Toronto, Ont.

The Toronto Electric Company, 101 Duke Street, Toronto, have been awarded the contract for electrical work on pipe shop and stables being erected at Front and Windsor Streets for Messrs. Crane Ltd.

The Canada Gazette announces the incorporation of the Sterno of Canada, Limited, with headquarters at Toronto, for the purpose of manufacturing and dealing in all kinds of electric fixtures and appliances, the capital stock of the company to be \$10,000.

Mr. E. B. Swackhamer, 33 North Street, Toronto has been awarded the contract for electrical work on \$18,000 club house for the Primrose Club; also for the electrical work on \$17,000 residence being erected on Poplar Plains Road.

The Ontario Gazette announces the incorporation of The Coleman Lamp Company, Limited, with head office at Toronto, for the purpose of manufacturing and dealing in all kinds of supplies, machinery and apparatus for commercial or domestic use for furnishing light and heat.

Messrs. W. F. Moon & Co., 2924 Dundas Street West, Toronto have been awarded the contract for electrical work on \$20,000 office building and apartments being erected on Royce Avenue for the Watt Milling and Feed Company.

The Ontario Gazette announces the incorporation of Chas. A. Branstion, Limited, with head office at Toronto,

for the purpose of manufacturing and dealing in electrical appliances, apparatus and instruments of all kinds appertaining to electrical work. The capital stock of the company will be \$100,000.

Messrs. Taylor Bros., 25½ Norwood Avenue, Toronto, have been awarded the contract for electrical work on \$40,000 addition to residence at 8 Glen Ridge Ave., St. Catharines, Ont.

Messrs. James Devonshire Ltd., 659 Yonge Street, Toronto, have been awarded the contract for electrical work on \$15,000 gasoline service station being erected at Queen & Jarvis Streets for the Imperial Oil Limited.

The Salisbury Electric Company, 34 Toronto St., Toronto, have been awarded the contract for electrical work on residence being built on College Heights for Mr. A. Foulds.

The Toronto Electric Company, 101 Duke Street, Toronto, have been awarded the contract for electrical work on a branch of the Imperial Bank being built at St. Clair & Boon Avenues.

Victoria, B. C.

The C. H. E. Williams Company, 509 Richards Street, Victoria have been awarded the contract for electrical work on \$300,000 theatre being erected in Victoria by the Famous Players Canadian Corporation.

Walkerville, Ont.

Messrs. McNaughton-McKay Electric Company, 33 Sandwich Street West, Windsor, Ontario, has been awarded the contract for electrical work on \$25,000 bank building being built in Walkerville by the Imperial Bank.

Westmount, Que.

Mr. Del. Vecchio, 380 Claremont Ave., Westmount, has been awarded the contract for electrical work on \$40,000 residence being erected on Edgehill Road for Mr. P. B. Earle.

Messrs. R. S. Muir & Co., 32 Park Avenue, Westmount, have been awarded the contract for electrical work on five residences being erected by the Bremner Norris Co. Ltd., at an approximate cost of \$70,000.

Winnipeg, Man.

Messrs. Schumacher Gray Co., Ltd., 187 Portage Avenue, Winnipeg, have been awarded the contract for electrical work on a \$30,000 theatre being erected in Winnipeg for The Garrick Theatre Ltd.

Messrs. Stephenson & Co., Ltd., 602 Avenue Block, Winnipeg, Man., have been appointed representatives for Western Canada for the National X-Ray Reflector Company. They will act in the capacity of sales representatives for the complete line of products manufactured by the X-Ray Company, and furnish co-operative assistance to the trade. Mr. Cochrane is well and favorably known in the Canadian West, having been for 12 years sales manager for Western Canada for the Northern Electric Co.

The City Light & Power Co., Winnipeg, have increased their connected load 12,000 kilowatts in the last year.

The Commerce Reports, Washington, D. C., state that there is a steady demand for electric lighting installations up to 40 kilowatts for estates, sugar factories, machine shops and other industries in the Netherlands East Indies. This business is handled by the engineering and machinery importing houses of which lists have been prepared and placed on file in the Bureau of Foreign and Domestic Commerce, Washington. Small lighting sets of 50 and 100 lamp capacity are also selling as rapidly as they can be imported, for homes and smaller plantations.



Announcing

—that hereafter the Main Electric Company will be known as the Canadian Electrical Supply Company, Limited and will be in a position to give you

“SERVICE”

of a very high order.

Canadian Electrical Supply Co., Limited
(Formerly Main Electric Co.)

Branch Offices and Warehouse :
28 St. Joseph St., Quebec

Head Offices and Warehouse :
165 Craig St. W., Montreal

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

WANTED—D. C. 220 volt motors, any horse-power up to 25

THE KAUFMAN RUBBER CO., LIMITED,
23-2 Kitchener, Ont.

FOR SALE—New one fifty horse power, one twenty-five horse power Crocker-Wheeler 3-phase, 25-cycle, 550 volts, 750 r.p.m. motors, have installed individual drive, price right, immediate delivery. P. O. Box 486, New Toronto. 25

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1. Walter Clinton, Welland, Ont. 22-3

For Sale

3—300 H.P. Westinghouse-Canadian Synchronous Motors; 3 Phase, 60 Cycle, 2200 Volts, 580/600 RPM.; equipped with Direct Connected Exciters; 2 Bearings, with extended shaft for coupling. ARTHUR S. PARTRIDGE.

1-2 415 Pine St., St. Louis.

Pitt River Electric Project Approved.

Authority to proceed with the Pitt River hydro-electric power plant project by which it is proposed to bring power to San Francisco at an eventual cost of \$125,000,000 in building construction, was granted by the State Railroad Commission recently to the Mount Shasta Power Corporation, a subsidiary of the Pacific Gas and Electric Company.

The proposed plans call for construction of five more hydro-electric plants on the Pitt River, utilizing the water between the confluence of the Fall River and the lower end of the big bend. Through this means it is expected power in excess of 300,000 kilowatts can be developed.

Proceedings of Pasadena Convention of The N.E.L.A. Ready for Distribution.

The proceedings of the Pasadena convention are now ready for distribution. The volume, which is made up of the papers presented at the forty-third convention of the National Electric Light Association, in Pasadena, contains a fund of valuable data. Various papers, addresses, reports and discussions presented during the General, Public Policy, Accounting, Commercial, Electric Vehicle, and Technical sessions are contained in the book, which weighs in the neighborhood of five and one-quarter pounds, exclusive of binding, and containing 822 pages of text and a large number of illustrations. The cost of volume, including paper, mailing, binding, etc., is in the neighborhood of \$3.00.

The book is divided into six parts, each part containing proceedings of a session. The index is so arranged that any particular paper can be found with a minimum loss of time. The book concludes with the names and addresses

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT Positions Desired and Vacant

Traffic Supervisor of Tramways and Motor Omnibus System seeks position. 13 years' experience London County Council Tramways, London, England.

Reply to J. Watson, 531 Ouellette Ave., Windsor, Ontario. 24-1

ELECTRICAL SALES ENGINEER—Man with illuminating engineering experience preferred, to act as commercial representative on factory and general lighting. Good income and prospects for future if right man. Headquarters Toronto or Montreal. Write full details, salary expected, to Holophane Co., 340 Madison Ave., New York City. 1

ELECTRICIAN, experienced in railway motor and transformer tests; three years in connection with electrical power company, operating power plant, rewinding single phase motors, testing meters, etc., desires position with power company or electrical manufacturing concern. Box 443, Electrical News, Toronto. 1

Manufacturers' Agents in Vancouver, B. C.

desires Agency Propositions on Electrical Specialties of proven merit. References on request Box 66, Electrical News, 212 Wm. Bldg., Vancouver, B. C. 2-2

Wanted

We want an Electrical Engineer, one who understands Motors, Generators and Transformer design, must have initiative ability and be a good organizer and systematizer, will only consider those who at present hold like positions, this position offers a bright future for the right man. All replies will be treated strictly confidential. Box 434, Electrical News, Toronto. 24-1

Repair Shop Foreman

We want a foreman to take complete charge of an Electrical Repair Shop employing twenty-five people. The man wanted must be able to personally do any and all work that might come up on Generators, Motors, Transformers and in fact any Electrical Apparatus. He must have initiative, ability and speed and be a good organizer and systematizer. Will only consider those who at present hold like positions and who can furnish unquestioned references. This position offers a bright future to the right kind of man. Kindly mention salary and all other details in first letter. Location one of the large cities in Eastern Canada.

All replies will be treated strictly confidential. Box 435, Electrical News, Toronto. 24-1

of the personnel of the Executive Committee, National Committees, Accounting Section Committees, Commercial Section Committees, Electric Vehicle Section Committees, Technical Section Committees, presidents of the association, honorary members, and the dates and places of previous conventions.

New Orders

are largely dependent on the quality of the material used in the construction. You can obtain full information regarding the right material at a glance by reading our reports.

Building and Engineering

Contracts through the service offered by MacLean's Daily Reports. These will give you news of the projects in which you are interested and when they are fully completed. You will know when tenders are called and contracts awarded, when to offer materials or services, and when to bid for the work you could wish for.

Write for full particulars.

MacLean Daily Reports, Limited
345 Adelaide St. West, Toronto

MacLean REPORTS

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-1

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Make
Used	1	100	3	25	550	710	Wagner
	1	60	3	25	550	750	Cr. W.
New	2	52	3	25	550	720	1/2 H.P.
Used	1	50	3	60	550	900	Cr. W.
	1	50	3	60	550	950	Westing
	1	50	3	25	550	720	Westing
New	1	35	3	25	550	720	Westing
Used	1	30	3	25	550	1500	Tor. & H.
	1	25	3	60	220	720	Cr. W.
	1	15	3	25	550	1450	Westing
New	1	15	3	25	550	1400	1/2 H.P.
	6	15	3	25	550	720	Westing
Used	1	11	3	25	550	725	Cr. W.
New	2	10	3	25	550	720	Westing
Used	1	7 1/2	3	25	220	1500	Tor. & H.
	1	7 1/2	3	25	550	1450	Cr. W.
	1	7 1/2	3	25	550	700	1/2 H.P.
New	3	7 1/2	3	25	550	720	Westing
	1	5	3	25	550	1400	Exhaust
	1	5	3	25	550	710	Wagner
	3	3	3	25	550	1450	1/2 H.P.
	1	3	3	25	550	1450	1/2 H.P.
	5	3	3	25	550	1450	Westing
	4	3	3	25	550	1400	Exhaust
	3	2	3	25	550	1450	1/2 H.P.
	2	2	3	25	550	1450	1/2 H.P.
	1	2	3	25	110	1400	Wagner
	2	2	3	25	550	1450	1/2 H.P.
Used	1	1	3	25	110	1400	Wagner
New	2	1	3	25	110	1400	Wagner
New	1	1	3	25	550	1450	1/2 H.P.
	2	1	3	25	110	1400	Wagner

Write for full particulars.

H. W. PETRIE, Limited
Front St. West Toronto Ont

WANTED

Engineering Graduate

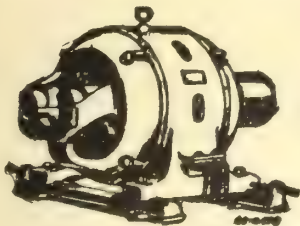
Location—Montreal

There is an opening on the Editorial Staff of the Hugh C. MacLean publications for a bright, young engineer, preferably a University Graduate, as Associate Editor. Some practical experience and a connection in the electrical field are desirable qualifications. Office headquarters will be Montreal. This position offers a good opportunity to the right man. Apply in person or by letter to either office.

HUGH C. MacLEAN, LIMITED

347 Adelaide Street West
Toronto

119 Board of Trade Building
Montreal



Machines In Our Montreal Stock

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new 'Kuhlman' Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately three to four weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.
1—300 H.P. 300 RPM. Slip Ring
2—300 H.P. 490 RPM.
1—100 H.P. 600 RPM.
2—75 H.P. 1200 RPM.
3 Phase 60 Cycle 550 Volt.
2—200 H.P. 600 RPM. Slip Ring.
1—100 H.P. 600 RPM. Slip Ring.
2—75 H.P. 900 RPM.
1—50 H.P. 900 RPM. Slip Ring.
1—50 H.P. 900 RPM.
3—50 H.P. 1200 RPM.
2—40 H.P. 1200 RPM.
4—35 H.P. 1200 RPM.
1—35 H.P. 1800 RPM.
4—35 H.P. 900 RPM.
3—30 H.P. 1200 RPM.
1—25 H.P. 900 RPM.
2—25 H.P. 1200 RPM.
1—20 H.P. 900 RPM.
2—15 H.P. 900 RPM.
1—10 H.P. 1800 RPM.
3—10 H.P. 1200 RPM.
3—10 H.P. 720 RPM.
1—8 H.P. 810 RPM. Crane
2—7½ H.P. 900 RPM.
7—7½ H.P. 1200 RPM.
2—7½ H.P. 1800 RPM.
3—5 H.P. 900 RPM.
23—5 H.P. 1800 RPM.
1—4 H.P. 1140 RPM. Crane
22—3 H.P. 1800 RPM.

12—3 H.P. 1200 RPM.
15—2 H.P. 1800 RPM.
14—2 H.P. 1200 RPM.
Single Phase 30 Cycle 110/220 Volt
1—1/8 H.P. 1415 RPM.
1—1/6 H.P. 1425 RPM.
2—1/6 H.P. 1750 RPM.
1—1/2 H.P. 1420 RPM.
3 Phase 60 Cycle 440 Volt
2—50 H.P. 900 RPM.
8—30 H.P. 900 RPM.
2—30 H.P. 850 RPM.
3 Phase 60 Cycle 220 Volt.
1—75 H.P. 900 RPM.
1—60 H.P. 900 RPM.
2—50 H.P. 900 RPM.
2—40 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—20 H.P. 1200 RPM.
1—15 H.P. 1200 RPM.
1—15 H.P. 1150 RPM. Slip Ring
3—10 H.P. 1800 RPM.
2—7½ H.P. 1750 RPM.
3—7½ H.P. 1200 RPM.
2—5 H.P. 900 RPM.
5—5 H.P. 1200 RPM.
2—3 H.P. 1200 RPM.
1—3 H.P. 1800 RPM.
Single Phase 60 Cycle 110 Volt.
2—7½ H.P. 1800 RPM.
3—5 H.P. 1800 RPM.

12—3 H.P. 1800 RPM.
1—3 H.P. 1165 RPM.
1—2½ H.P. 1800 RPM.
11—2 H.P. 1800 RPM.
7—1 H.P. 1800 RPM.
6—3/4 H.P. 1800 RPM.
23—1/2 H.P. 1800 RPM.
15—1/3 H.P. 1800 RPM.
45—1/4 H.P. 1800 RPM.
16—1/6 H.P. 1800 RPM.
2—1/6 H.P. 1200 RPM.
6—1/8 H.P. 1800 RPM.

TRANSFORMERS

1—40 K.V.A. 2200/110 Volts.
1—30 K.V.A. 2200/110 Volts.
2—25 K.V.A. 2200/550 Volts.
2—15 K.V.A. 2200/550 Volts.
6—10 K.V.A. 2200/550 Volts.
6—7½ K.V.A. 2200/550 Volts.
5—5 K.V.A. 2200/550 Volts.
3—3 K.V.A. 2200/550 Volts.
2—2½ K.V.A. 2200/550 Volts.
2—6 K.V.A. 2200/110 Volts.

D. C. MOTORS & GENERATORS

1—40 H.P. 220 Volts.
1—35 H.P. 220 Volts.
1—17 H.P. 110 Volts.
1—8 H.P. 125 Volts.
1—8 H.P. 120 Volts.
2—1/6 H.P. 320 Volts.

Phone, wire or write us for further information.

Electric Motor and Machinery Co., Limited 417 St. James St., Montreal, Que
Tel. Main 2177—Main 18. Night Call Rock 3523

Motors in Stock

- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
 1 10 hp. C.W. 750 rev., starter, rails, pulley.
 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
 3 ½ hp. 1200 rev. clutch type T.H.E.
 1 1 hp. 1800 rev. split phase Peerless.
 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
 NEW SINGLE PHASE MOTORS in STOCK—REPULSION
 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 SPLIT PHASE
 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 2 ¾ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 4 ¾ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 4 ¾ hp. Ohio 110 volt, 60 cycle, 1800 rev.
 4 ¾ hp. Menominee 110 volt, 25 cycle, 1500 rev.

**Toronto and Hamilton Electric
Co., Limited**

HAMILTON

ONTARIO



Type No. 860

Loud Ringing Extension Bell for factory call systems, operates on 75 to 110 volts, A.C., 16 to 25 cycle, 2500 ohm ringer coils.

Prices and Literature Sent on Request.

Manufactured by

CENTURY TELEPHONE CONSTRUCTION CO.
BRIDGEBURG, ONT.

*A Bright
and Prosperous
New Year
is
Extended to All*

The
DUNCAN ELECTRICAL CO. Ltd.
MONTREAL, - CANADA

Western Representatives:
COCHRANE STEPHENSON & CO., Limited, Winnipeg.
Maritime Representative:
F. M. WHELPLEY, Halifax.

Tenders Wanted

should be advertised for in the "Tenders and For Sale Department" of the CONTRACT RECORD AND ENGINEERING REVIEW. This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses. File your plans for any work on which you are inviting bids in our offices at Toronto, Montreal, Winnipeg or Vancouver.

**Contract Record
and Engineering Review**
TORONTO - ONTARIO

Motors in Stock for Immediate Delivery

Single Phase—25 Cycle			
10—1/8	H.P.	motors	
6—1/4	"	variable speed	
6—1/2	"	Century	
1—1/2	"	Wagner	
3—1	"	Wagner	
2—3	"	Century 730 RPM.	
Single Phase—60 Cycle			
2—1/2	H.P.	110 v. 1700 RPM.	
4—1/6	"	110 v. 1750 RPM.	
3—1/4	"	110 v. 1750 RPM.	
2—1/8	"	110 v. 1750 RPM.	
Three Phase—25 Cycle			
1—1	H.P.	550 v. C.G.E.—720 RPM.	
2—1	"	550 v. Westhse., 1400 & 720 RPM	
2—2	"	550 v. Westhse. 1400 & 720 RPM.	
1—2	"	550 v. Langdon-Davies, 1400 RPM.	
1—3	"	550 v. Westhse., 1400 RPM.	
2—5	"	550 v. Westhse., 720 RPM.	
1—5	"	550 v. Westhse., 1400 RPM.	
1—5	"	550 v. C.G.E., 1400 RPM.	
1—20	"	1—25 H.P., 1—30 H.P., 1—40 H.P. 1—550 H.P. 550 volts	
Three Phase—60 Cycle			
1—7 1/2	H.P.	220 v. Lincoln, 1200 RPM.	
1—10	"	220 v. Globe, 1750 RPM.	
1—15	"	220 v. Lincoln, 1200 RPM.	
1—20	"	220 v. 1200 RPM.	
1—25	"	220 v. 1200 RPM.	
1—30	"	220 v. 1200 RPM.	
1—20	"	550 v. 1200 RPM.	
1—25	"	550 v. 900 RPM.	
1—30	"	550 v. 900 RPM.	
1—60	"	550 v. 720 RPM. Westinghouse.	
1—75	"	550 v. 720 RPM. Westinghouse.	

We have other miscellaneous sizes in 25 and 60 cycle motors, 220-440 & 550 volts.

We also handle oil, gas and gasoline engines of all sizes.

The Industrial Engineering Co.

of Canada, Limited.

WINDSOR, ONT.
25 Royal Bank Bldg.

TORONTO, ONT.
28 Wellington St. W.



ENGINE TYPE UNITS

25 CYCLE

GENERATOR			ENGINES		
K.W.	Volts	Make	RPM.	Cyl	Dimensions Make
4 1/2	220	Westinghouse	250	12	x 14 Buckeye
115	220	Westinghouse	250	11	x 15 Buckeye
150	480	Westinghouse	250	14	x 24 x 14 Westinghouse
250	2200	Westinghouse	150	14	x 28 x 30 McL-Seymour
250	220	Westinghouse	214	15	x 22 x 17 MacKintosh
300	2200		150	15	x 32 x 30 McL-Seymour
400	2300	Westinghouse	107	18	x 32 x 42 Rice & Sergeant
400	370	Westinghouse	150	20	x 28 x 36 Ham. Corliss
400	220	Westinghouse	136	18	x 36 Brown Corliss
450	550	Westinghouse	125		McL-Seymour
500	10,000	Westinghouse	125	700	H.P. Buckeye
650	1360		100	22	x 44 x 48 Westinghouse
800	370	General Elec.	94	26	x 50 x 48 C. & C.
860	380	Westinghouse	83	28	x 42 x 48 Filer & Stowell
1000	240	Crocker Wheeler	107	24	x 48 x 42 Hoover Owens

Generators in the above units can be rewound to any desired voltage at moderate expense.

MacGovern & Co., Inc. 285 Beaver Hall Hill, Montreal

Offices; New York, Pittsburgh, Seattle
Plants: Brooklyn, N.Y., Lincoln, N.J., and Linden, N.J.
Buyers and Sellers of New and Used Machinery
A CONTINENT-WIDE SERVICE

Electrical Equipment

IMMEDIATE SALE

These generators, motors, transformers, etc., are available for IMMEDIATE sale and shipment. The apparatus has all been used but is in first class condition—many principal items have had but little operating service. The prices are extremely low. The apparatus will be available only until DECEMBER 1, 1920. After that date all will be taken off the market.

A. C. GENERATORS—3 PHASE

Item	No.	K.V.A.	Volts	Cycles	R.P.M.	Maker
1.	1.	75	550	60	900	Can. Westinghouse
2.	(Note) 1.	350	600	60	514	Westinghouse
3.	1.	300	440	25	237	Westinghouse
4.	1.	450	440	25	300	Westinghouse

All field volts 110-125. Rheostats included. Exciters not included. Miscellaneous spare armature and field coils included.

Note:—Item 2 has squirrel cage winding on field for use as motor. Also bedplate extension and outboard bearing with drive sheave.

D. C. MOTORS

Item	No.	H.P.	R.P.M.	Volts	Winding	Maker
5.	1.	30	1100	250	Shunt	C. G. E.
6.	1.	35	975	250	Shunt	C. G. E.
7.	1.	95	700	500	Shunt	C. G. E.
8.	4.	7 1/2	760	500	Series	Westinghouse
9.	2.	30	900	550	Series	Browning
10.	2	Spare armatures for Item 9.				Browning
11.	1.	50	900	550	Series	Browning
12.	1.	12	(750—1000)	550	Compound	Fort Wayne
13.	2	40	990	550	Compound	G. E.

Items 12 and 13 have vertical shafts.

POWER TRANSFORMERS—25 CYCLES

Item	No.	K.V.A.	Volts	Type	Make
14.	3.	100	2200/1980/370/185	HR-Form R.P.	G. E. 15% reactance
15.	2.	15	440/220/110	H-Form E.	G. E.
16.	2.	10	440/220/110	H-Form E.	G. E.
17.	2.	15	400/220/110		Pittsburg

VOLTAGE TRANSFORMERS—25 CYCLES

18.	24	100 watts	400/100	Dry Type	Westinghouse
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CURRENT TRANSFORMERS

19.	18	100/5 Amperes	3500 Volts	Type B	Westinghouse
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METER

20.	1.	600 Amps.	600 Volt	2-wire	Thomson Watthour Meter. G. E.
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Inspection invited.

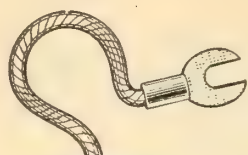
Prices quoted promptly.

Address—POWER STATION

Laurentide Power Company
Limited

Grand Mere,

Quebec



**An
Acknowledged
Leader**



The No-Spark Carbon Brush

When inferior brushes are giving trouble, then the No-Spark should be substituted—just to demonstrate the difference.

Central station men swear by
No-Spark Carbon Brushes.

Try Them.

CALEBAUGH Self-Lubricating Carbon Co.

1503 Columbia Ave., PHILADELPHIA, PA.
Canadian Representatives: Electrical Equipment Com-
pany, Limited, Montreal, Canada.

Saving Money on Motors

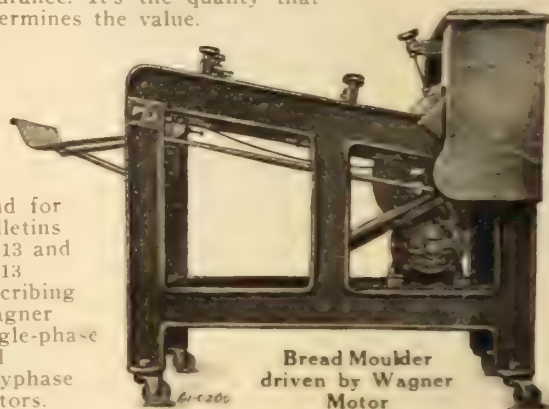
does not mean buying the lowest priced motors. That's penny-wise policy. You can only save money when the first cost is practically the last cost.

Maintenance and repair costs, the cost of interrupted production are the factors to be considered first in motor buying.

If you pay more for Wagner motors you are buying power insurance. It's the quality that determines the value.

Wagner Quality

Motors
are 40° Motors



Send for
Bulletins
11813 and
12213
describing
Wagner
single-phase
and
polyphase
motors.

Wagner Electric Manufacturing Company
of Canada Limited - Montreal

420 Power Bldg., Montreal

183 George St., Toronto

ELECTRICAL WIRE

Used by contractors who do good work

Our Electrical Bare and Insulated Wire and Cable is used by contractors known for their high class work.

We also manufacture Wire Rope, and can meet your requirements. Steel, Crucible, Plough or Cast steel in standard sizes, always in stock.

Get in touch with our nearest branch.



CANADA WIRE & CABLE COMPANY LIMITED

TORONTO

Phone Belmont 2300

District Offices and Warehouses:

674 Barrington St.,
Halifax, N. S.

143 Beaver Hall Hill
Montreal, Que.

145 Market Ave
Winnipeg, Man

738-11th Ave West
Calgary, Alta

1101 Hamilton St
Vancouver, B C

Electrical Books—Special Prices

The following Books are Offered Subject to Previous Sale:

"American Electricians' Handbook, a reference book for practical electrical workers, by Terrell Croft. 712 pages, with over 900 illustrations. Published by McGraw-Hill Book Co. Price \$5.00.

A Handbook on the Steam Engine, by Herman Haeder. Published in 1914 by Crosby, Lockwood & Son. 522 pages, illustrated. Price \$2.00.

A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published in 1912 by Renouf Publishing Company. 248 pages, illustrated. Price \$1.50.

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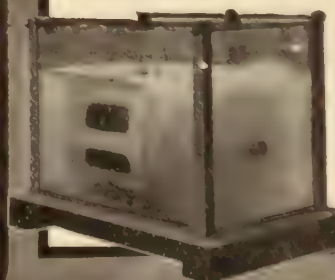
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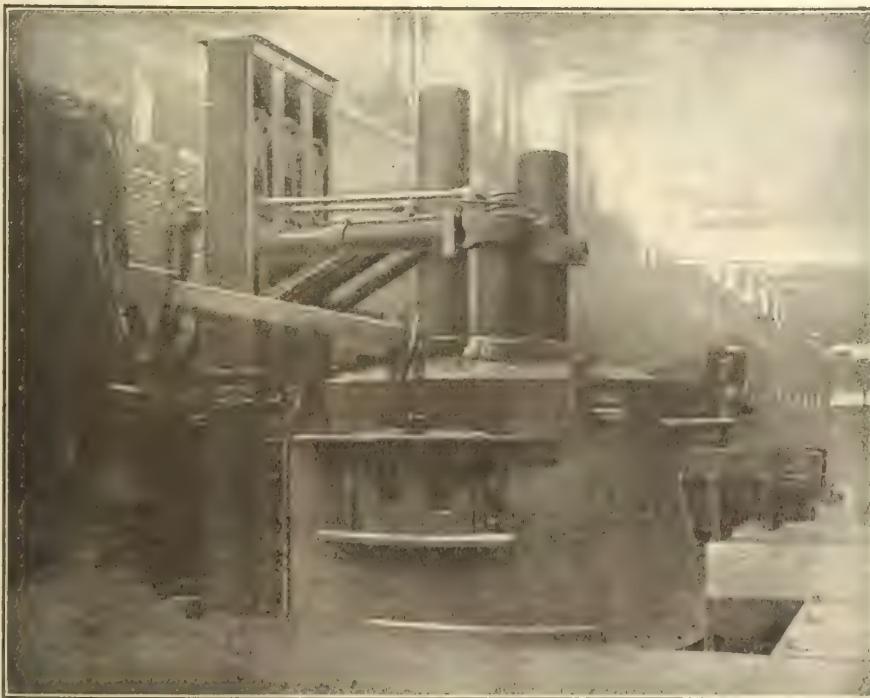
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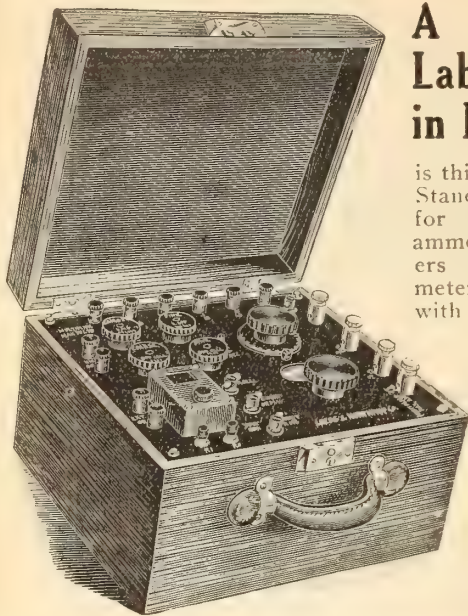
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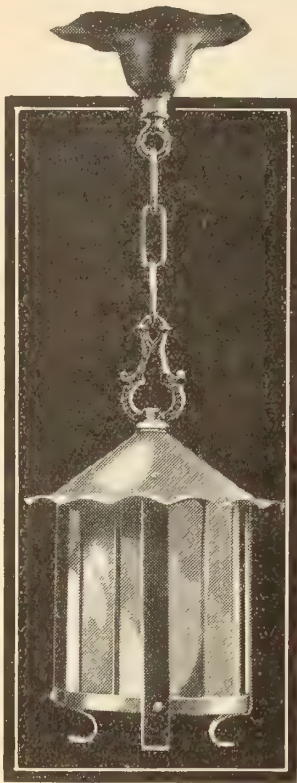
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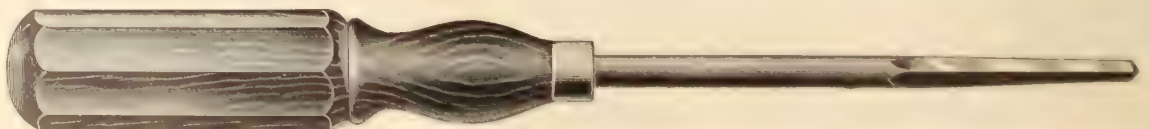
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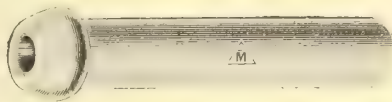
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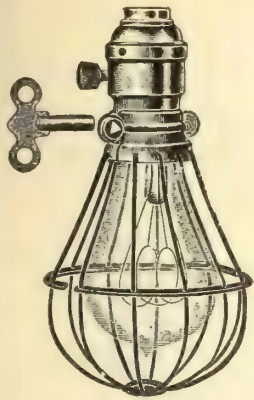
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Canadian Westinghouse Company
Economy Fuse & Manufacturing Company
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Northern Electric Company
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Safeguarding the Lamp

From Theft or Breakage **LOXON** Does It!

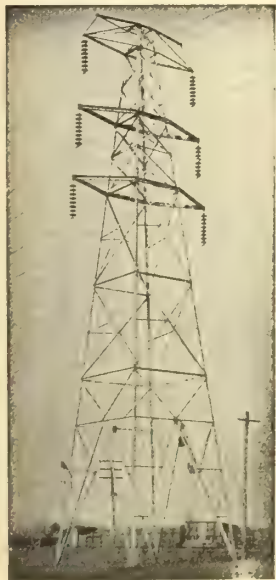
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Many other electrical specialties which will make money for you. Get in touch with us. Illustrated price lists free.

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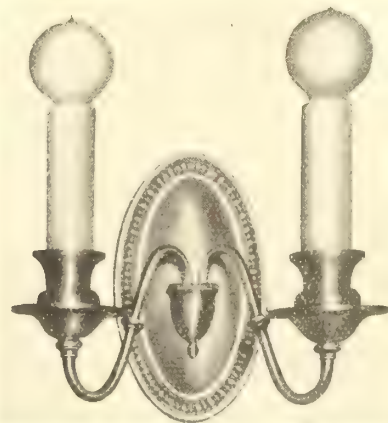
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Structural Steel of all Kinds
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No. 2640

**LIGHTING FIXTURES
OF
ELEGANT SIMPLICITY**

Tallman Brass & Metal Limited
HAMILTON, ONT.

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All forms of Mica Insulation.

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Mica Splittings—Washers—Ground Mica.

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They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices. No obligation.

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Irving Smith, 602 New Birks Building, Montreal.

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OUTDOOR SUB-STATIONS

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Ridout & Maybee

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PORCELAIN BUSHINGS

Electrical Development & Machine Co.

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Thomson Company, Limited, Fred

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Electrical Development & Machine Co.
RHEOSTAT BOXES AND ACCESSORIES
Canadian Drill & Electric Box Company

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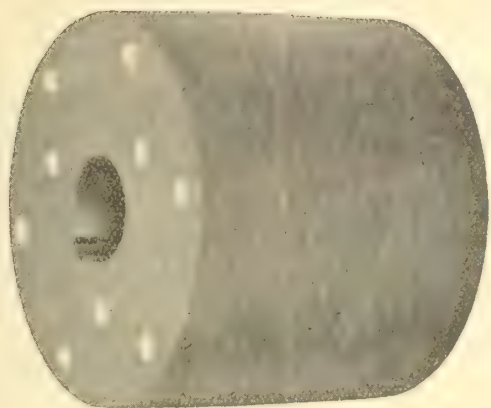
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Duncan Electrical Company
National Metal Molding Company
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Pringle, R. E. T.

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Davis Slate & Mfg. Company

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Diamond Fibre Pulleys are practically indestructible, are light in weight, and are far more economical than pulleys made of other materials.

Tell us the diameter, face, size of keyway or set screw hole and send a sketch of the pulleys that you use. We will quote you prices and send you a copy of our new Pulley Folder. Use the coupon!

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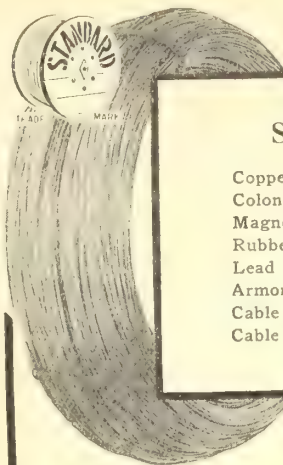
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Please send your new Pulley Folder and quote your price on pulleys according to these specifications.

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Cable Junction Boxes, etc.

OVER 38 years of specialized experience in the manufacture and installation of electric wires and cables is the guarantee back of STANDARD Products.

We have unexcelled manufacturing and shipping facilities for meeting your requirements of these products promptly.

*Write our nearest office for
complete information*

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of Canada, Limited**

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SAFETY FROST

Non-injurious to the skin, non-inflammable and absolutely permanent.

Easy to apply—Simply dip into can and allow excess to drip back for two minutes, and wash off with water.

Is not affected by weather or heat of lamp. It is on to stay.

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Davis Slate & Mfg. Company

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This is pure cotton cellulose chemically treated to form a hard bone-like insulating material. It is extremely tough and can be driven into positions where nothing else can be used. Made in sheets, rods, tubes and special shapes.

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Canadian Agent

Frank T. Groome

1710 ROYAL BANK BLDG.

Toronto Phone Adel. 106



Profitable Business

in the New England Push Switch

Here is a splendid line that you can profitably handle. The New England Push Switch has, after most stringent tests, been approved by the Underwriters. (It was actually operated 124,000 times without showing the least sign of wear). Why not let us send you full particulars?

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AGENT:

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*We Respectfully Solicit Your
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JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.

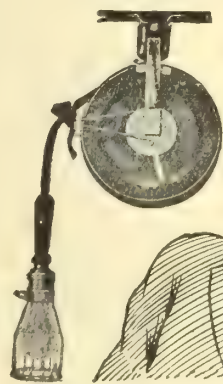
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The Kyle Boring Machine

is operated by a ratchet arrangement with a strap drive instead of the old clumsy chain pull, which was a constant source of bother and injury to the hands. The Kyle is speedier, easier to operate, stronger and more compact. (It will drill a hole in a 3" joist in 20 seconds or less). It is instantly adjustable from 4½ ft. to 13½ ft. For old or new work.



Canadian Hykon Company
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"Just What I Want"

This is exactly what you, or any one else, will say after having bothered around with loose extension cords.

The Automatic Extension Reel for Electric Lamps

Obviates the necessity of dragging your cord over the floor, thus wearing out insulation and breaking sockets, guards, etc. Takes your light just where you want it, locks at any point, and automatically rewinds your cord when you are through with light. Contains 25 feet of approved reinforced weatherproof cord.

Approved by the Underwriters, and endorsed by fire and electrical bureaus everywhere. Fully protected by two basic patents and more pending. Write for further particulars and prices.

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Inc.

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1/10 to 1/4 H.P.
Repulsion Start Induction

Single Phase Motors



1/10 H.P. MOTOR

The first consideration in their design and construction has always been the development of their keep-a-running ability—then an even balancing of their starting and operating characteristics.

The world wide existing demand evidences the high order of satisfaction obtained from their installation. Other sizes up to 40 H.P.

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Always found on the best
motor driven appliances.

The Best Made Motor

TROUBLE PROOF—"THE MOTOR SHE KNOWS"

A good motor enhances
the value of the appliance
it drives.

Westinghouse

SERVICE REPAIR SHOPS

MONTREAL—10 St. Sophie Lane

WINNIPEG—158 Portage Ave., E.

TORONTO—366 Adelaide W.

VANCOUVER—1090 Mainland St.

CALGARY—316 3rd Ave., E.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

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A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

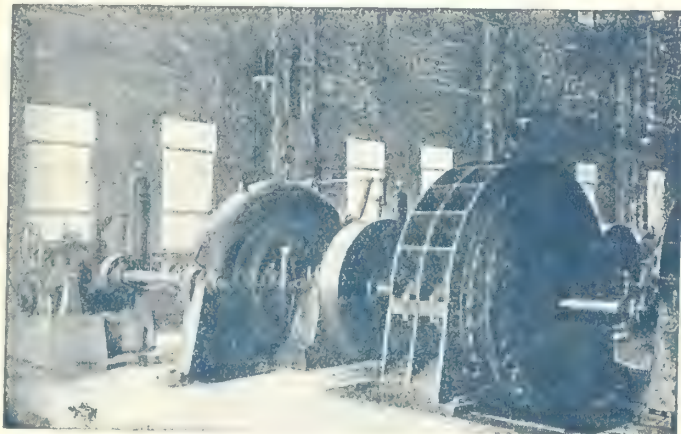
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

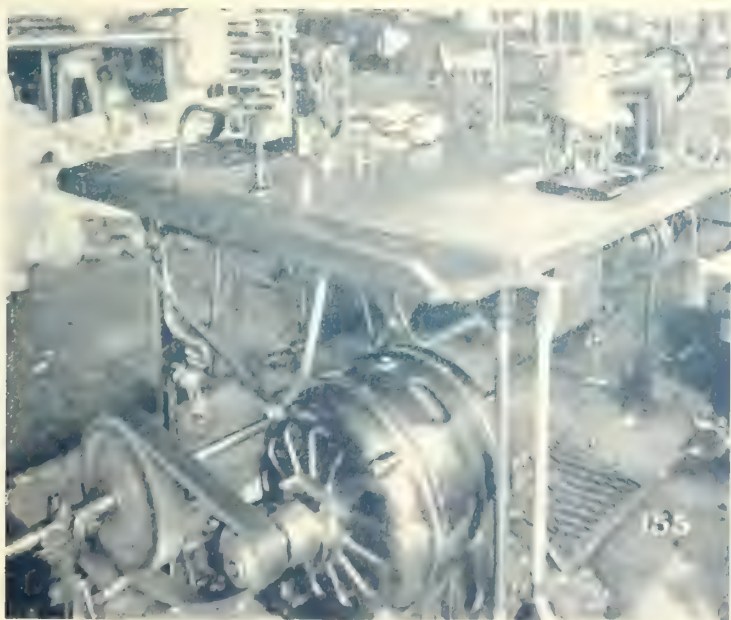
The Electrical Maintenance & Repairs Company, Limited

Phones:
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Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
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Morse High Speed Silent Chains



5 H.P. Morse Chain, Driving Sewing Machine Line Shaft.

Save Power and Space

*Send Us Your
Transmission
Problems.*

Jones & Glassco Reg'd

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TORONTO

MONTREAL

USED ELECTRIC MOTORS

IN STOCK DECEMBER 21st

A. C. MOTORS

550 Volts, 3 Phase, 60 Cycle			
H.P.	1800 rpm.	Thomson	
10	"	1800	" Thomson
25	"	1800	" Fairbanks
30	"	1800	" Thomson
40	"	1800	" C. G. E.
50	"	900	" C. G. E.
75	"	1200	" C. G. E.
100	"	1200	" Westinghouse
300	"	720	" Westinghouse

220 Volts, 3 Phase, 60 Cycle			
H.P.	1800 RPM.	A.C.B.	
10	"	1800	" A.C.B.
25	"	1200	" S. G. E.
30	"	900	" A. C. B.
40	"	720	" Westinghouse
50	"	900	" Westinghouse
75	"	720	" Fairbanks

2200 Volts 3 Phase 60 Cycle			
H.P.	1200 RPM.	A.C.B.	
100	"	720	" C.G.E.
200	"	720	" C.G.E.

A. C. GENERATORS

- 1—75 K.W. 2300 volt, 3 phase, 60 cycle, 900 rpm., revolving field type C.G.E. generator.
1—250 K. W. 250 volt, 3 phase, 60 cycle, 600 rpm., revolving field type C.G.E. generator.

TRANSFORMERS

- 2—7½ K.V.A. 2200-220/110 volts, 60 cycle, C.G.E.
2—200 K.V.A. 2200-220/110 volts, 60 cycle, C.G.E.

D. C. MOTORS AND GENERATORS

110 Volts			
K.W.	1850 rpm.	C. G. E.	
6	H.P.	1465 RPM.	Westinghouse
2	"	660	" C.G.E.
10	"	700	" G. E. (crane)
2-11	"	700	" Westge. (crane)
20	"	850	" Lundell
25	"	735	" Bullock
50	"	950	" Westinghouse
51	"	850	" Westinghouse

220 Volts			
H.P.	925 RPM.	C.G.E.	
20	K.W.	500	" Crocker Wheeler
30	"	950	" Westinghouse
50	"	925	" Westinghouse
100	"	650	" Westinghouse

500 Volts			
H.P.	1800 RPM.	C.G.E.	
10	"	1800	" C.G.E.
25	"	1400	" C.G.E.
30	"	1000	" A.C.B.
50	"	720	" Westinghouse
75	"	720	" Westinghouse
100	"	825	" Westinghouse

All the above in first-class condition and guaranteed.

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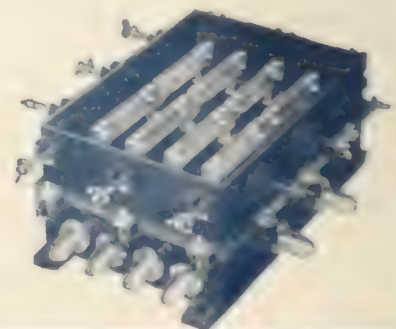
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Your cable ends are vital not only in the sense that they must be carefully protected but also in the sense that they are a logical point for sectionalization and control of your distribution. Proper provision for emergency switching and cut overs at your cable ends will give the flexibility which is essential to proper distribution.

G & W Potheads and Boxes give absolute protection to the cable and at the same time can be the basis of a flexible distribution system.



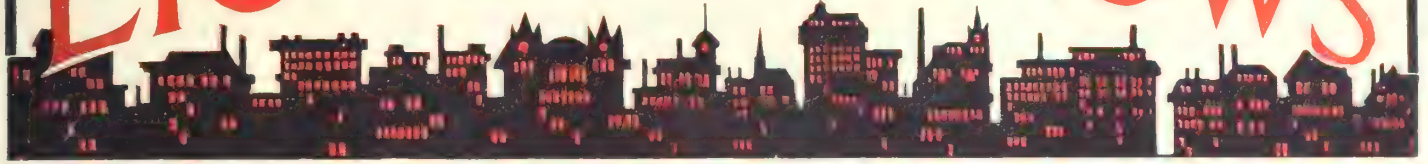
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7440-52 So. Chicago Ave.

CHICAGO, U.S.A.

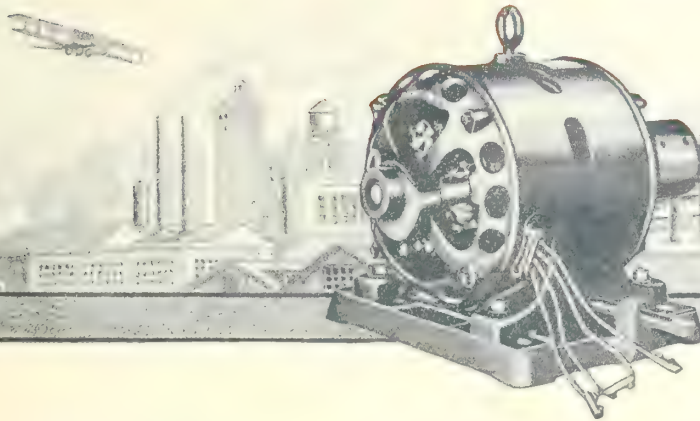
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because of their heavy starting torque (not less than 300% full load torque) are of particular value in overcoming heavy static and friction loads so prevalent during the winter season.

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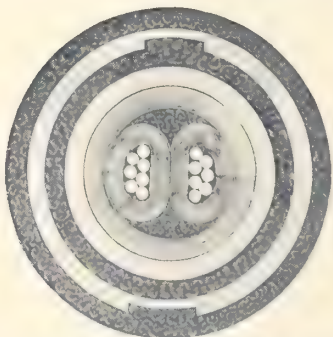
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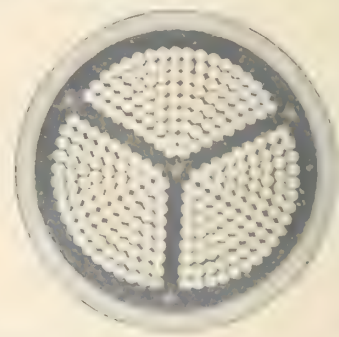
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The Torch Relay
An Ancient method of
Grecian communication



Cross Section of a two conductor No. 6 B & S paper insulated, lead covered and double steel tape armored cable for a working pressure of 6000 Volts. This type of Cable is eminently suitable for installations where the cable is laid in the ground without cable ducts. The steel tape armoring affords ample protection to the lead sheath.



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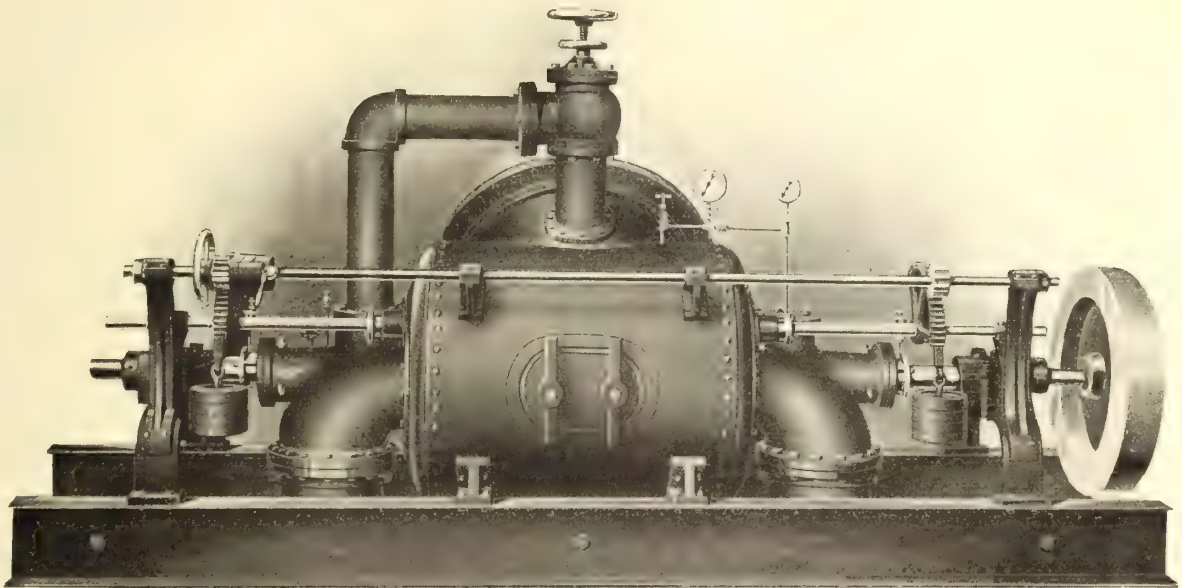
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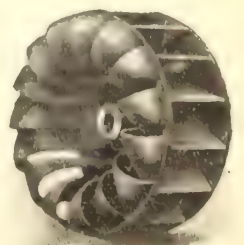
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And in this FAUCET OF ELECTRIC SERVICE, you never worry about its carrying the heavy loads of electric heating devices.

The *Levolier* socket is noted for its smooth, easy pull in any direction.

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McGill Mfg. Co.

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O-B *Modernized Insulators*

So far as is known the longest span in the world is on the Knoxville Power Company transmission line.

The horizontal distance between supports is 5010 feet. The difference in elevation is 208.5 feet. O-B Strain Insulator No. 13430 carries the 500,000 CM steel cored aluminum conductors which are under a tension of 19,000 to 20,000 pounds at 80°F. Operation is at 150,000 Volts.

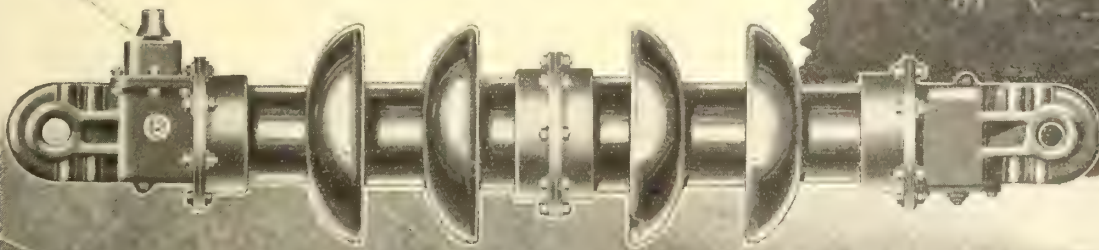
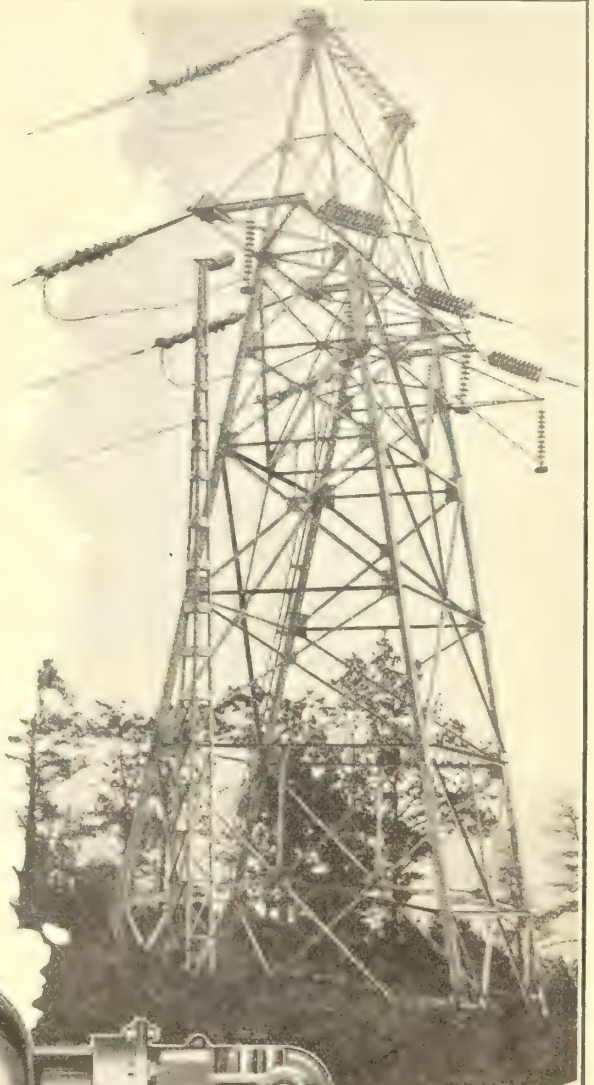
There is an O-B Strain Insulator for every practical service from small stay insulators to ones for long span, high voltage transmission or radio work.

The Ohio Brass Company, Mansfield, Ohio

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San Francisco Los Angeles Paris, France

*Manufacturers: High Tension Porcelain Insulators, Trolley Material,
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This Insulator, which carries the 5010 ft. span, is good for 40,000 lbs. working load and for 150,000 volts.





Would You Accurately Meter Half the Current You Furnish and Estimate the Balance?

In the past, it has been necessary that you do this very thing.

You measure the kilowatt hour consumption with an accurate meter, but you guess at the maximum demand.

Now you can measure **all** parts of the service you furnish. The Lincoln Demand Meter enables you to read the customer's maximum each time you read his kw. hour consumption.

You bill each of your customers on a definite basis. They are satisfied because the personal element in no way enters into their bills. They know that they pay for their actual consumption and their just share of your fixed charges.

Write for further particulars. Ask us to reserve for you a copy of the new Lincoln book which gives full particulars. It will soon be ready for distribution.

Lincoln Meter Co., Limited
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Cable "Meters" Toronto Phone College 1374



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

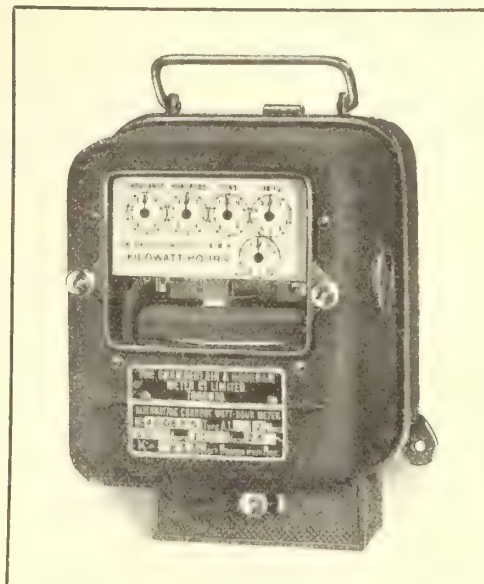
Lincoln
MAXIMUM DEMAND
meter

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302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

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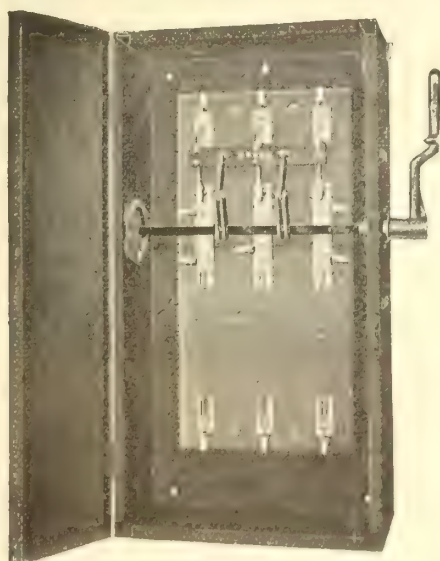


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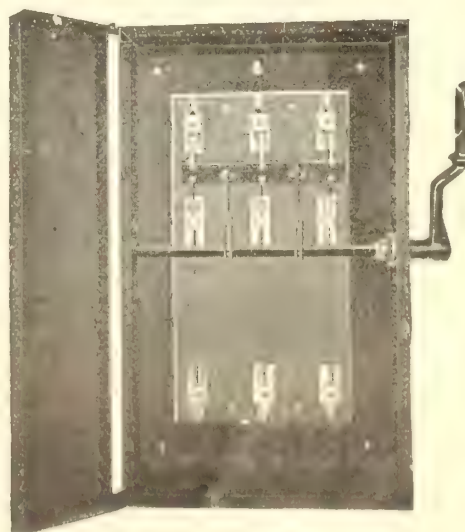
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100 Amps., 550 Volts Compensator Switch



100 Amp., 550 Volts Entrance Switch

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to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine. Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.

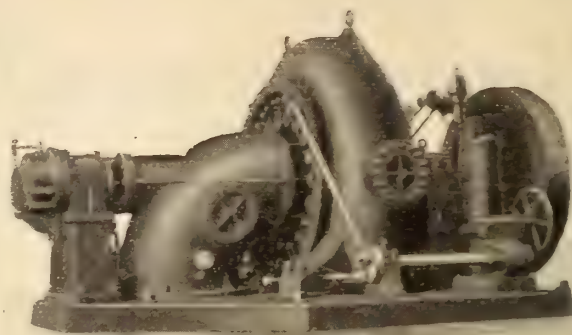


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Canadian Hykon Company

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Accompanying illustration shows one of three single horizontal shaft, "Francis" type

SMITH HYDRAULIC TURBINES

Recently installed in Spain; each developing 3200 Horse Power, at 500 R.P.M. under 328 ft. head.

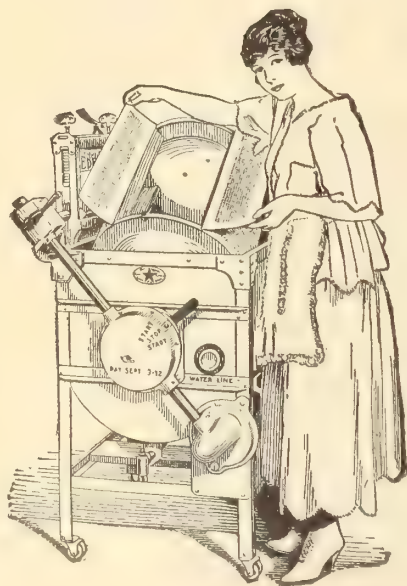
To sustain the hydraulic thrust of the runner, each unit is equipped with a Gibbs Thrust Bearing.

If interested, write for Bulletin "N."

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Practically every woman in every home, once a week, has to face the wash-day problem. And if you have something to offer her that will really free her from the dreariest and weariest of household tasks, it is bound to appeal.

The **Eden**

fills every requirement of wash-day labor-saving. It saves work, clothes and money and is the one machine that once sold, stays sold.

Simplicity of operation is an Eden characteristic. It has been designed from the woman's point of view and with this in mind it has been so constructed that all moving parts are enclosed and nothing to confuse or annoy the woman in her work.

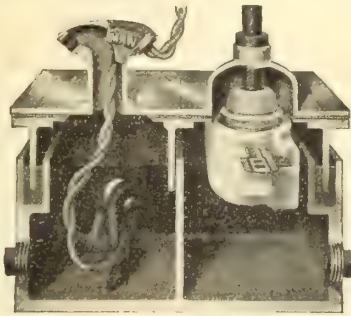
The **Eden** IS THE MACHINE FOR THE LIVE DEALER

The Great West Electric Company, Limited

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Fullman Floor Outlets

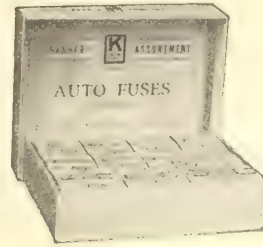
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Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment
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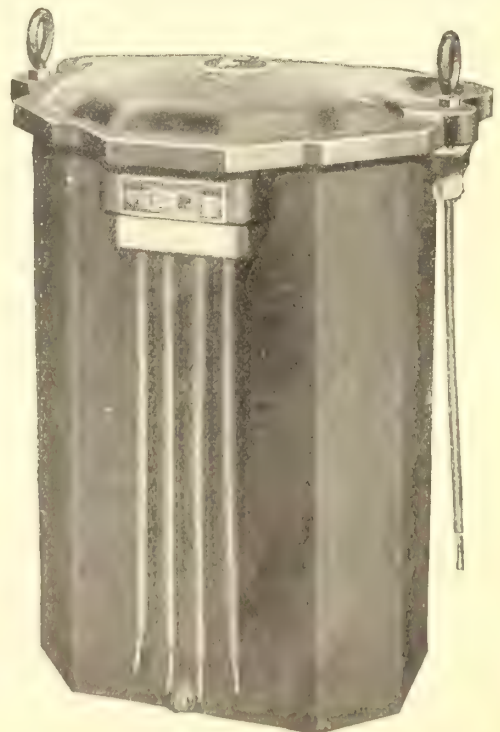
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*All terminals are well under the oil.
Ferranti Steel Case Transformers are
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**All sizes of Service Transformers
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Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

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“GALVADUCT”

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A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

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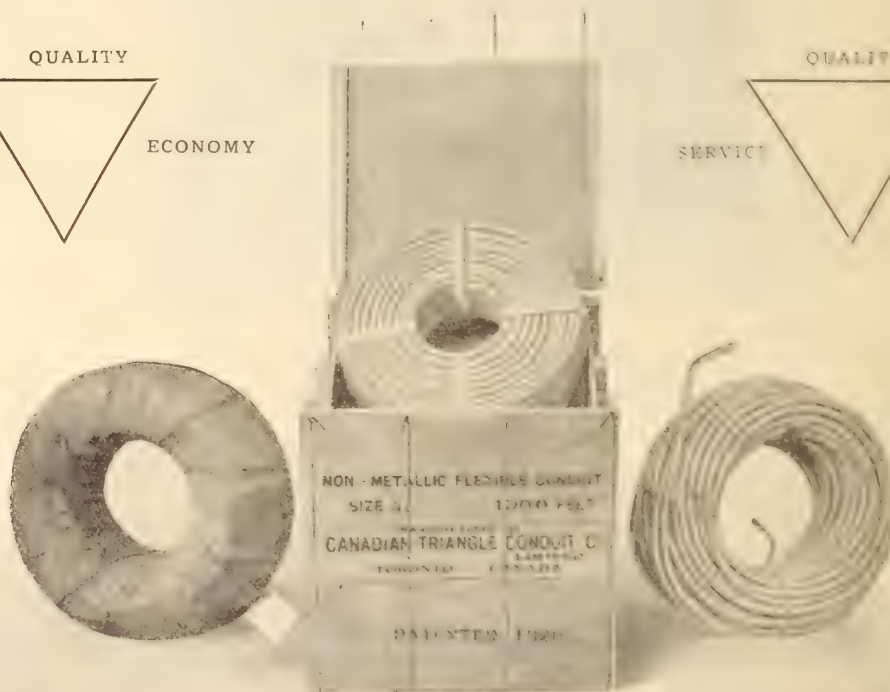
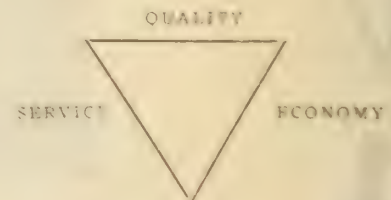
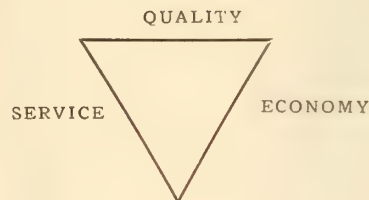
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These are the points built into the products of this organization. We would have you know and remember them. They are inseparably connected with all that we make and do.



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Generating Station Equipment

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It pays to buy the "FRANKLIN"—because the "FRANKLIN" brings perfection both mechanical and electrical plus an added element of safety that has improved on every competing device.

"You can install the 'FRANKLIN' and forget it." Write for bulletins and see why each one is safer and better for your use.

**ELECTRICAL DEVELOPMENT
& MACHINE COMPANY**
Philadelphia

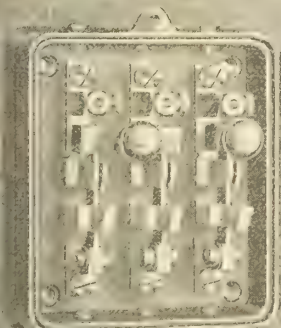
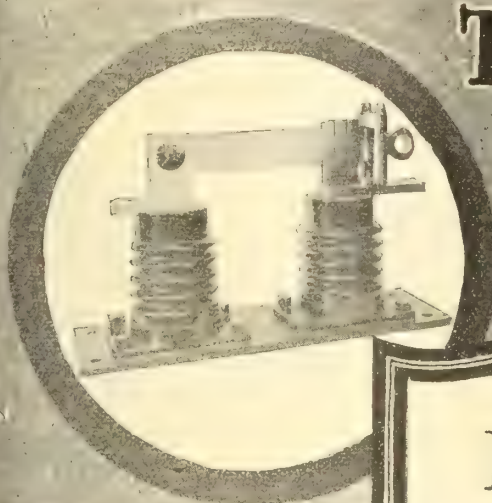
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Announcement

CANADIAN LACO LAMPS,
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**CANADIAN TUNGSTEN LAMP
COMPANY, Limited**
HAMILTON, ONT.

**CANADIAN WESTINGHOUSE
COMPANY, Limited**
HAMILTON, ONT.

WE desire to announce that the Canadian Tungsten Lamp Company, Limited, of Hamilton, the Canadian Laco Lamps, Limited of Toronto and Montreal, and the Canadian Westinghouse Company, Limited, of Hamilton, have been granted licenses to manufacture and sell drawn wire tungsten filament incandescent lamps and gas filled incandescent lamps under patents owned by the Canadian General Electric Company, Limited. Any other manufacturers of tungsten filament incandescent lamps or gas filled incandescent lamps in Canada are infringers of the patents of the Canadian General Electric Company, Limited.

Among these patents are the following:—
Numbers—140,301; 140,302; 140,303; 140,350; 140,351; 140,352; 142,703; 152,924; 155,290; 156,373; 159,743; 162,445; 162,446; 162,570; 162,693; 164,828; 166,120; 166,121; 166,536; 167,329; 169,276; 169,936; 174,211; 176,010; 176,742; 177,227; 177,881; 179,117; 182,732; 185,854; 185,855; 186,072; 188,091; 188,141; 189,568; 190,194; 192,792; 197,329; 197,330; 198,329.

In the maintenance of its property rights it is the duty of the Canadian General Electric Company, Limited, to see that its patents are respected. Therefore, notice is given to manufacturers, purchasers or users, of infringing tungsten filament incandescent lamps or gas filled incandescent lamps that they will be held liable to the Canadian General Electric Company, Limited, on account of such infringement.

Canadian General Electric Co., Limited

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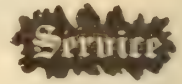
“MADE IN CANADA”

Canadian General Electric Co., Limited

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If in a fit of economy—
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posed that you can get
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CIRCUIT BREAKERS

we may have to wait
until you have a change
of heart, which won't be
long.

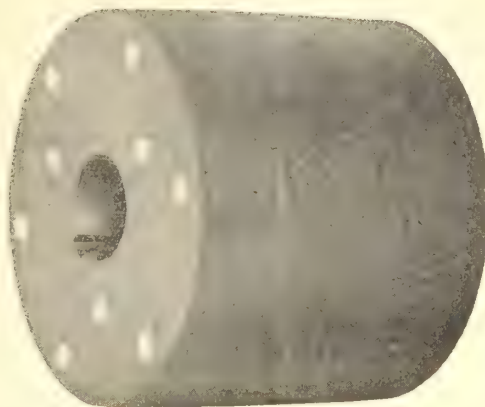
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are proving superior for direct motor
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keyways, and with crown or straight
face.

Diamond Fibre Pulleys are practical-
ly indestructible, are light in weight,
and are far more economical than
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Tell us the diameter, face, size of
keyway or set screw hole and send
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We will quote you prices and send
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Use the coupon!

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*Very Restful
to the Eyes*

This handsome two-piece unit has the advantage of an upper shade that acts as a false ceiling, and reflects the light through the semi-translucent glass of the "Moonstone" lower bowl. The light is diffused, giving it the soft pleasant glow of daylight, and therefore being very restful to the eyes.

Dealers are finding "Jeffersonlite" a remarkable seller. It demonstrates itself wherever hung.



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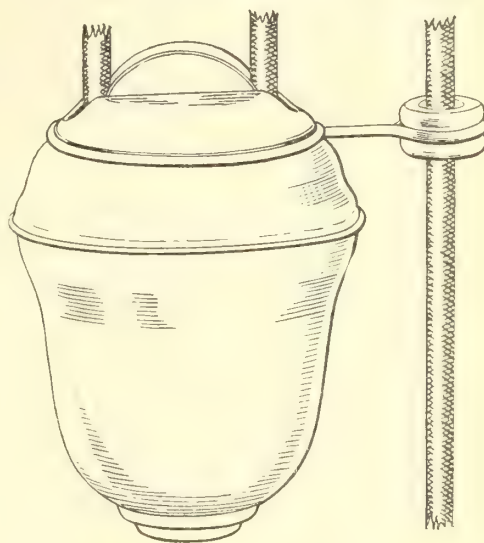
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Made from the best of material and packed in individual boxes, finished White Enamel, hydro approval number.

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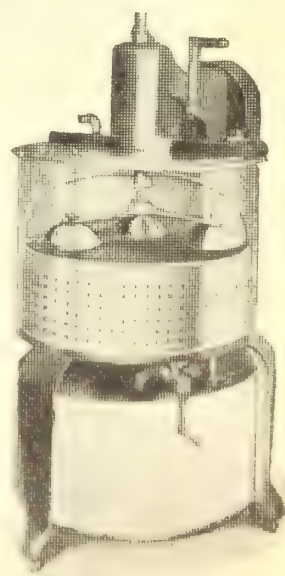
With the KLYMAX ELECTRIC VACUUM WASHER

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Let us send you our folder which explains every detail of this machine—the only one on the market which does all the washing, boiling, rinsing, and wringer-drying without handling the clothes.



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Don't let the severe weather catch you unprepared, freezing up your pipes and causing you heavy expense.



We have a large stock of Service Transformers on hand ready to supply you at a moment's notice.

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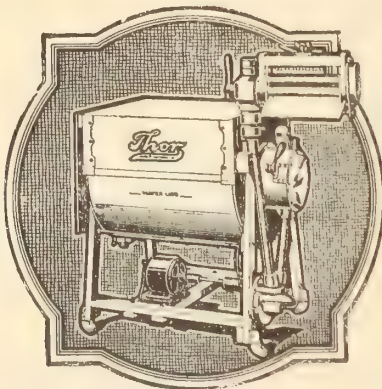
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413 YONGE ST.

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You'll Want This Display For Your Window During The Coming Fan Season



¶ The figures are life size and beautifully lithographed in eight colors.

¶ In the breeze of a fan the balloon in the child's hands bobs about in a way which is sure to attract the attention of passers-by.



¶ The display is shipped free, transportation prepaid to all distributors and dealers in R & M Fans who wish it.

¶ In addition to this window display, the 1921 line of "R & M Advertising Helps" includes booklets, folders, lantern slides, transfer signs, newspaper advertising plates, and a motion picture trailer film.

¶ Samples of these "Helps" are shown in dealer Ad. Book No. 1159. A copy will be sent on request.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans



ACCURATE X-RAY

Show Window Lighting
for
**More
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For nearly thirty years the recognized journal for the
Electrical Interests of Canada.

Published Semi-Monthly By

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Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

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Toronto, January 15, 1921

No. 2

There is No Need, and Little Sign, of Depression in the Electrical Industry

The electrical industry seems to be forcing itself into line with other industries and taking up the cry "hard times" and "depression." We say "forcing" deliberately, because there is no evidence, or practically none, of the slowing up in demand for general electrical equipment.

It would seem that some of us have got the idea that because business is slow in certain other lines of industry it must necessarily follow that it is slow in our own. That viewpoint however does not take into consideration a number of conditions peculiar to the electrical industry. Being a new industry there is this fundamental difference in comparison with all the other industries, viz., that whereas the fields of older industries have been thoroughly worked over, saturated time after time, thus forcing a "depression" until the situation righted itself by the development of a new demand—whereas this is true of practically all the old industries, it is not at all true of the electrical industry. The field for electrical products has never been developed to anywhere near capacity—it is a common expression to say the surface has barely been scratched—consequently further development is not held back by a slowing up in other lines.

It is this feature of non-saturation that should keep the electrical business humming through any and every period of depression for many, many years to come. When will

all our waterpowers have been developed? When, all our factories properly fitted with motor drive, and properly lighted? When, all our homes equipped with labor saving devices? When this time comes—and it is very far in the future—then, perhaps, but not till then, electrical men will be justified in taking note of "depressions" in other lines of trade.

For goodness sake, then, let us stop drawing such long faces. There is no new building, you say. Well, what of it? That may cause the hardware merchant and the plumber some anxiety, but let us turn our attention to the thousands upon thousands of buildings already erected that need more electrical equipment. All over Canada there are numberless wiring jobs waiting to be sold; also better lighting installations, more efficient and more complete motor drive, and at least two million homes not one of which is "saturated" with labor saving appliances. There is no sign that our people haven't the money to buy. Indeed there are many and gratifying signs that the public is spending with greater discrimination than a year or two ago, and such an attitude is decidedly in favor of a greater turnover in essentials. Let us look at things in the electrical business as they actually are, therefore, and leave this imaginary "depression" out of our calculations for next year's business.

What is the Best Way to Prevent Further Bathroom Fatalities?

Another bathroom fatality in Toronto brings up the question once more of the hazard attached to portable heaters. So far as past experience goes the hazard is a minimum except in the presence of water or damp floors or walls, that is, conditions found in the bathroom or generally speaking in a basement or laundry. In this latest fatality, which is the second of its kind to occur in Toronto, poor insulation brought one of the service wires in contact with the frame of the heater. The woman, who was killed while standing in the water in the bathtub, probably reached out and touched the heater. Another possible explanation is that the heater was in actual contact with the bath, and that she turned on the current while standing in the water, the socket being within her reach.

It is a most difficult problem, and the accident if given wide publicity is very apt to create the impression with the buying public that all such heaters are unsafe under all conditions. The only thing at the moment that it seems possible to do is for contractors and dealers to impress upon people the inadvisability of touching electrical apparatus while their hands are wet or while they are in contact with water.

The only real solution of the situation as we see it is the grounding of the frames, which, under present conditions is almost an impossibility, as it would require the re-wiring of practically all buildings.

It seems indeed a terrible calamity that an accident so easily preventable should be able to cause such disastrous results. We must not forget, however, that the fatalities from the use of electricity are far less than those arising from the use of gas, the only difference being that we seem to have become accustomed to the gas fatalities and to accept them almost as a matter of course. We would suggest, however, that the prevention of similar accidents might well form the principal topic of discussion at the municipal convention which is being held during the present month in Toronto, as well as at other electrical conventions that may meet from time to time, and that electrical men in whatever branch of the industry should set themselves the task of finding a definite solution of this problem before they lay it aside.

Toronto Branch A.I.E.E. Discuss Legislation for the Engineering Profession and Approve the General Principle of the Act to be Presented Next Session

The programme at the regular semi-monthly meeting of the Toronto section of the A. I. E. E., held in the Chemistry and Mining Building, University of Toronto, on Friday evening, January 7th, consisted in a discussion of the subject of legislation for the engineering profession. The work of the Advisory Conference Committee was briefly outlined by the chairman, and the report of the sub-committee was read, in which it was pointed out that among other motives behind this effort to obtain legislation were, first, that the engineer wanted to obtain professional status, and second, that a practising engineer, or an engineer who took his responsibility direct from the public or his client should be compelled under the act to be a registered engineer in the province.

A lively discussion of the report followed, among those taking part being Mr. R. R. Stevenson, Mr. Don Carlos, Professor Price, Mr. Amos, Mr. O. V. Anderson, Mr. Ferrier, Mr. Wills MacLachlan, Professor Gill, Mr. Hastings, Mr. P. A. Borden, and others.

The opinion was expressed by one member that he considered the report a remarkable piece of work because of the way in which the bills presented by the E. I. C., and the J. C. T. O.,—bills that were so far removed in spirit—had been united in a reasonably satisfactory form in this present report. He reminded the members that no bill is ever entirely satisfactory, and that every good design is a good compromise. He pointed out the reasonable amount of autonomy given to each branch of the profession so that they can expand and grow, under a unifying influence. At the same time the bill did not go after the public too hard. They were allowed a certain measure of freedom and the engineer was moderately protected. He also expressed the opinion that there was no better body than the Advisory Committee to deal with the drafting of the final bill for presentation to parliament. This latter sentiment was expressed by nearly all the speakers, one member stating that while the report no doubt required to be changed in phraseology at different points, yet the general principles laid down should be approved by the association.

A member asked what means would be used in electing those who would form the Provisional Council. This it was explained was not specified in the report, although it was pointed out that obviously the legislature would ask the various engineering bodies to suggest the names of suitable persons. It was also explained that it would be necessary that the names of those chosen for the Provisional Council would have to be written into the bill before it passed its third reading.

Another question raised was whether there was not a danger that legislation of this nature would make the engineering profession a close corporation. This it was pointed out would not be possible with the government holding the right, under the act, to share in choosing the personnel of the council.

One of the members then expressed difficulty in understanding the meaning of the second paragraph of clause (k) on page six. This clause, it was explained, was originally written as a definition of the "practice of engineering," but as the committee progressed they found difficulty with the word "practice" and decided to include this second paragraph in order to remove the danger of penalties being imposed for infringement of the act, against someone who was not really

practising engineering under the meaning of the act, such as an engineer who, while capable of doing the work of a practising engineer, was not dealing direct with the public, but through an employer. It was pointed out that the question was largely one of responsibility, not one of imposing penalties, and that for the immediate present at least a certain amount of leniency would have to be exercised, until a certain status had been reached by the profession, when it might be found advisable to tighten the reins a little. The member was referred to sections 10, 12, 13 and 13(c) covering the qualifications of professional engineers and their entry into registration.

The question was also raised as to why applicants for registration should be required under the act to submit their credentials to the council instead of the branch of the profession affected. The member was referred to clause 10 (d) as showing that the credentials were acted on by the branch of the profession affected, in the name of the council.

The question of penalties came in for criticism on the part of one member, who claimed that the spirit of the new age called for "leading" men instead of "clubbing" them; that the engineer should be encouraged to register and be a good engineer, rather than penalized into obeying the act. It seemed to be the general feeling of the meeting, however, that without penalties the bill would have no measure of enforcement, and would simply become a protection for the title "Registered Engineer." One member warned the association that by eliminating penalties the bill would fail of the very fundamental cause of its existence, namely, the protection of the public. If the public were to be adequately protected it was absolutely necessary that penalties be provided. The objector was reminded that it was not the intention of the association to start out by seeing how many "heads" they could get, but that the penalizing power would only be exercised in extreme cases.

A brief outline of the recent Ottawa meeting was given by Professor Gill, who supported strongly the idea that the bill was primarily for the protection of the public, and secondarily for raising the standing of the engineering profession. He thought the main thing was to get something on the statute books.

After considerable discussion on various points, a motion was moved and seconded that the bill be adopted on its general principles, and that the advisory committee be requested to draft a final bill for presentation to the legislature, taking into consideration the evening's discussion and any written suggestions that might be sent in to the committee by the members of the association.

The resolution was as follows: "Resolved, that the A. I. E. E., Toronto section, approves the general principles of the act respecting professional engineering; that it empowers its representatives on the Advisory Conference Committee of Engineering Legislation to act for it in preparing and arranging for the presentation of the bill to the legislature in the form of the act."

The meeting closed with a few congratulatory remarks from Mr. Wynne-Roberts, chairman of the Toronto section of the Engineering Institute of Canada.

Mr. Frank L. Butler, manager of the Winnipeg Electric Railway Company, has been appointed to take charge of the railway department of the Georgia Railway and Power Co., Atlanta, Georgia. Mr. Butler leaves to take up his new duties on February 1st. Before coming to Winnipeg Mr. Butler was general manager of the Chicago and West Towns Railway Co.

The Alexanderson Alternator—A Laughable Satire from "Radio News" on a Paper Reproduced in Our Last Issue

It has been generally conceded that the most essential requisite for reliable long-distance radio communication is a wave of the undamped variety. Several methods are in use for the generation of undamped waves, and the most successful of these is the Alexanderson Radio Frequency Alternator.

In the first place, this machine is manufactured by the General Electric Company, and they are manufactured in such large quantities that the G. E. Co. had to find a simplified name for them, so they therefore called them just alternating current generators, and painted them red. Now this bright color has a very important action on the operation of the machine, although very few people are aware of it. It is generally understood that ultra-violet rays are produced by a very high-frequency current. There is a horn gap situated on the top of the alternator. This horn gap is so located that it is in the center of the magnetic field, and is completely surrounded by red.

Now Professor Snitchblossom, of the Royal Botanical Museum, tells us in his "Twenty Years Among the Bugs" of the great attraction which the color red has for insectivorous life. Now the frequency of an insect's wing is well-known to be among the thousands. A piece of cheese is placed on the horn gap in such a position that the insect will fly around it. In their frenzied desire to get at the cheese their little wings generate an oscillating current of tremendous frequency. This current in turn has a refractory action on the violet red color of the machine and thus produces ultra-violet rays. These rays are collected in a large basket by the Alternator attendant and are turned over to the Shift engineer. The Shift engineer shifts the rays about, sorts them out according to polarity, weighs them, makes an entry on the log sheet, and then dumps them into a wash-tub-looking affair called a magnetic amplifier.

Now this magnetic amplifier is one of Mr. Alexanderson's most important inventions. It consists of a complete space in the form of a circle, filled with two sets of vacuums placed at right angles to each other. These vacuums act inductively, therefore, on the field of the alternator and cause an output onto the antenna. The antenna used with the Alexanderson system is called the multiple-tuned antenna. This is undoubtedly the only antenna in the world which is an aid to politics. An indication of this fact was seen when President Wilson and Secretary Daniels used it in their "Heart to Heart Talks for Wayward Democrats." This antenna, ever since its use by President Wilson in his transatlantic telephone conversation, has had the peculiar property of doubling and even trebling the amperes a good many times. A complete understanding of this phenomena is not available at the present writing, but it is hinted that Christian Science radiation meters are used at some stations.

Probably the most interesting and creditable part of this system is the device used to increase the efficiency of the alternator. Credit for this device is due to Mr. William Clark, of Newark, New Jersey, U.S.A. Mr. Clark immediately realized the value of trained bugs to the Corporation, so he started along these lines. He figured that after the common variety of June bug flew across the gap 347 times it was powerless to resist the temptation to stop and alight on the cheese. Now the result of such action is easily seen. The poor insect is instantly electrocuted. Mr. Clark therefore had to find a way to detract the bug's attention from the cheese; so upon investigation he found that by slightly altering the phase relation of the cheese to the

negative horn gap and by throwing pies at the shift engineer he could make the bug fly back and forth across the horn gap 596 times. Now the frequency of a June bug's wing is purely a matter of conjecture. It is rumored that the General Electric Company spent thousands of dollars upon research work along these lines and finally hit upon a method of, ascertaining frequency. They found a man named Blanding, who rapidly became interested in the work and sent him to Marion. It is understood that Mr. Blanding's knowledge of the generation of insectivorous frequencies is wide and extensive and at some later date it is hoped to publish some results of his work along these lines.

An Interesting Legal Case

An interesting legal case has just been decided in the Court of Appeals between the Montreal Light Heat and Power Company and the Consolidated Realty Company, the latter the owners of the Linton Apartments in Montreal. A number of years ago the owners of the Linton entered into a five year contract with the Montreal Light Heat & Power Company to supply light and power, the contract representing the exclusive privilege of supplying electric current to the tenants of these apartments.

Some time after the five year contract had run out the owners of the Linton entered into a contract with another supply company and disconnected the service of the Montreal Light Heat & Power Co. Out of this arose a claim for \$10,000 damages.

The matter was fought out some months ago in the Court of Review and a decision rendered in favor of the Realty Company. Four of the five judges have now confirmed the decision of the Court of Appeal, only one judge dissenting. Mr. Justice Pelletier, speaking for the majority, pointed out that the Realty Company in all its contracts with its tenants reserved the right to require them to take electric energy from such a company as it may designate. There was only one service into the building and this was property of the Linton Company. Before service could be supplied by two different companies it would be necessary to pierce the walls of this apartment without the consent of the owners which he held could not be legal. The dissenting judge was of the opinion that the conditions existing at the time the dispute originated should be taken into consideration as well as the terms of the contract. A year had been allowed to elapse after the expiration of the five year contract before any dispute arose, during which time it would appear that the contract had been renewed. It was also well known to the Linton Company that tenants were making contracts with the Montreal Light Heat & Power Company for considerable periods of time and they had not raised objections.

Big Distribution of Safety Literature

During 1920 the Safety League has issued and distributed thousands of bulletins, cards, notices, etc., which have been sent all over the province. The distribution includes 275,000 safety bulletins to industries, electric railways, etc., 115,000 school safety bulletins, 225,000 gummed stickers, 150,000 letters to parents, 240,000 pay envelope slips, 120,000 window cards and many thousands of smaller pieces of safety literature and cards.

There were two outstanding features in connection with the work of the League in 1920; first, the three-day Safety Convention in Toronto last April, when representatives from Ontario, Manitoba, Quebec and Nova Scotia were present to hear papers on important phases of accident prevention in the industries, and, second, the drive against accidents in general in the spectacular "Safety Week" cam-

paign in October. "Safety Week" was observed in fifteen cities throughout Ontario and was productive of wonderful results.

The Executive Committee of the Ontario Safety League has plans for an extension of the work of the League in the industries, in the schools and among the pupils generally. The Seventh Annual Meeting will be held in 1921.

Service-at-Cost in Toledo

The city of Toledo is the latest to fall in line and operate their electric railway on a service at cost basis. The matter was recently voted upon by the electors of that city, and although Toledo has been one of the most erratic cities on the continent as regards the attitude of the public towards this utility, their vote in this particular case was definitely in favor of the service at cost by about four to one. The alternative was described in the Electric Railway Journal as an "anomalous municipal ownership proposition."

A fare of 6 cents cash and a charge of one cent for a transfer will be the arrangement in effect for the first six months. After July 1st these rates are subject to change depending on the fund which may or may not have been built up. The system is to be operated by a board of control consisting of three members.

The return to the traction company is based on a fixed valuation and the bonds representing this amount will draw 6 per cent. interest. All additional financing is to be by the issue of preferred stock which is to yield 9 per cent.

The change in the attitude of the Toledo public from one of antagonism to the company has been brought about apparently in a comparatively short time by a campaign of education which has placed the public in possession of accurate details regarding the operation of street cars.

Importation Prohibited

The Committee Reports states that by a decree dated September 8th, 1920, the importation into Venezuela of supplies and equipment for telephones and telegraph is prohibited unless previously authorized by the bureau of statistics. The application for permission to import these commodities should state when the order will be placed, number and class of articles to be imported, and the purpose for which they are to be imported. A period of two months from promulgation of the decree will be allowed for notifying the bureau of impending orders.

Earnings Increasing

The earnings of the Southern Canada Power Company for the first two months of their new fiscal year show an encouraging increase over corresponding period a year ago. For November only the net earnings were \$31,667.48, being an increase of \$7,503.97 over November, 1919. For the two months, October and November, 1920, the net earnings were \$59,015.22, being an increase of \$10,069.17 over the same period the previous year.

Barely Meeting Expenses

Mr. A. B. Ingram, vice-chairman of the Ontario Railway and Municipal Board, is reported to have stated that the finances of the London Street Railway, London, Ont., since the board took over the operation of the road, have been barely sufficient to make both ends meet, and that the prospects for the company are not any too bright. A statement covering the period of operation is being prepared for publication. Mr. Ingram intimated that the Railway Board is more than willing to hand over the street car system to any authority that is willing to assume the responsibility.

Electrification of Otira Tunnel in New Zealand

(Consul-General Alfred A. Winslow, Auckland.)

The English Electrical Co. (of England) has been awarded the contract for the electrification of the Otira Tunnel, the amount of its bid being \$1,289,690. This tunnel, which is to connect the line of railroad extending from Christchurch to meet the line from Westport that passes under the Otira Gorge, is about 5 miles long, and it is proposed to operate trains through it by electricity secured from the Lake Coleridge hydro-electric plant.

There were only two tenders for this work, one from the National Electrical Co., a New Zealand corporation, and the other from the English Electrical Co., London, a comparatively new concern. The New Zealand company is not a manufacturer of electrical supplies, but depends upon the open market for all machinery and materials, and is said to be in the market for "the best goods for the money."

It is said that the National Electrical Co. quoted for American machinery and lost because it was higher, considering the adverse exchange rate. The difference was only \$92,667. *Continued on Page 15*

Wages Cut Twenty Per Cent.

Fifteen hundred trackmen employed by the Cleveland Railway Company of Cleveland, Ohio, have been cut 20 per cent. in wages as the result of a general reduction in salaries in all departments. They had been getting 50 cents an hour and now will receive 40 cents. Shopmen, machinists and carpenters have also been cut from 15 to 20 per cent., and it is expected that the wages of the conductors and motormen will be reduced when their contract expires on May 1st, according to John J. Stanley, president of the company, who stated that the reason for these reductions was because of the depleted condition of the interest fund, the barometer of fare prices under the Taylor grant by which the city controls the street lines.

Insistent Demand for Small Motors

Demand for a number of small motors has been very good during the past month; possibly the chief point worthy of note is the active and continued enquiry for small motors up to 1 h.p. So insistent is this demand that many manufacturers are now devoting special attention to the production of such motors, and are turning out motors of excellent quality.

Some interesting electrical engineering exhibits were shown at the recent Glasgow Exhibition, and among these may be mentioned an 800 k.w. 50-cycle Peebles-la-cour motor converter, displayed by Bruce, Peebles & Co., Ltd., Edinburgh. This is a set similar to six ordered from them by the Mersey Docks and Harbour Board, while they were also showing a 1,500 k.w. 25-cycle rotary converter, one of 12 sets ordered by the Glasgow Corporation.

Malcolm & Allan, Ltd., Glasgow, had a varied range of exhibits; but chiefly interesting was the Wild-Barfield steel tempering plant, with pyroscopic detector for automatically hardening carbon steel.

Archibald Low & Sons, Ltd., Glasgow, showed a wide range of appliances for ships—heating, cooking, etc.; while J. A. Kinnaird & Co., Ltd., Glasgow, in addition to ships' appliances, exhibited pumping sets and an electric vehicle, electric rivet heater, etc.

Other interesting exhibits included electric lorries, switch-gear, electric stoves and fires, and measuring instruments.

This statement is made by the Officers in charge of the office of the Department of Overseas Trade, in Toronto, based on information supplied from the head office in London.

The Testing and Approval of Electrical Appliances in the Province of Ontario

By W. P. Dobson*

In the elimination of fire and accident hazards from electrical installations two closely related but separate features are involved. One of these has to do with the method of installation and necessitates a visual examination of the completed work to detect hazards due to improper or careless methods. The other feature is supplementary to this and is concerned with the quality and condition of the materials and apparatus employed. It involves careful tests under standard conditions which are not usually obtainable except in a laboratory. This feature of electrical inspection may be designated approval testing as distinct from the first feature or field inspection. Approval testing is the function of the Approval Laboratory of the Commission.

In early days of the Electrical Inspection Department the work of approval was carried on by that department in conjunction with field inspection. Devices and materials which bore the label of Underwriters' Laboratories of the United States were accepted as satisfactory in any installation. Much material, however, continually appeared on the market, which had not been approved by the Underwriters' Laboratories and such material was examined and approved by the Electrical Inspection Department. Labels were distributed to manufacturers for use with certain types of goods such as service boxes, motor starters and electric signs. The number and variety of devices and materials appearing on the market increased so rapidly that it was found impossible for the Inspection Department to carry on both approval and field inspection, especially in cases when laboratory tests were necessary. Accordingly in 1917 the approval testing was turned over to the Laboratories Department of the Commission and a section was organized to carry on the work under the name of the Approval Laboratory.

Scope of Work

The scope of the work is indicated by the wording of the announcement made by the Commission at the time of the organization of the Approval Laboratory. This reads as follows:—

Pursuant to Power Commission Act, 6 Geo. V., Chapter 19, Section 10, 1916, and amendments thereto, and the Rules and Regulations of the Hydro-Electric Power Commission, covering the design and construction of electrical machinery, apparatus, appliances, devices, material and equipment, for use in the generation, transmission, distribution or use of electrical power or energy in the Province of Ontario, in connection with any electrical installation or wiring for electric light, heat or power, where the electric pressure delivered to or from the same exceeds 10 volts, manufacturers of, jobbers, agents and dealers in electrical machinery, apparatus, appliances, devices, material and equipment, and others interested are hereby notified that the Commission orders that, on and after three months from date of this notice no such electrical machinery, apparatus, appliances, devices, material or equipment used or to be used, as above, may be used, offered for sale or disposed of in the Province of Ontario unless and until the design submitted to the Hydro-Electric Power Commission of Ontario and approval of such has formally been obtained.

[This notice was published in Ontario Gazette of January 15, 1918.]

While any device designed to operate on a circuit of

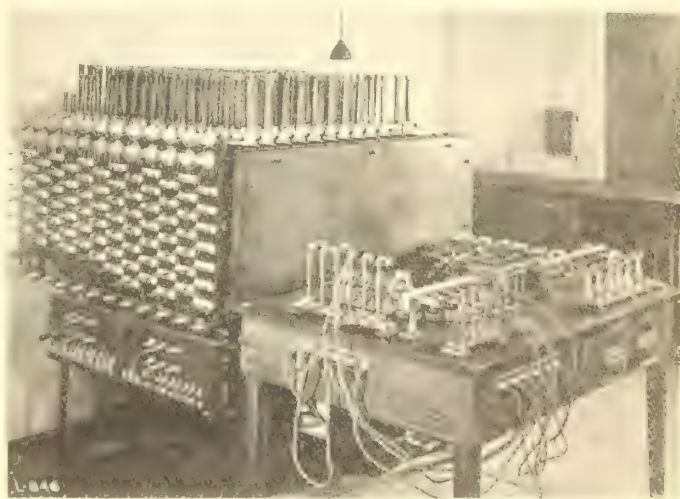
over 10 volts comes within the jurisdiction of the Approval Laboratory, the work of approval testing has been confined chiefly to devices rated at 600 volts or less; special attention being given to those classes of appliances which are sold to the public for unrestricted use.

The following incomplete list will indicate the diversity of devices and materials which have been submitted for approval and tested in the Laboratory.

Wires for electric ranges, ground clamps, conduit and conduit fittings, enclosed motor starting switches, switch boxes, electric signs, cabinets and cutout boxes, panelboards, high frequency generators, electrically operated pumps, rectifiers, sockets, receptacles, lamp shades, lamp fixtures and fittings, wire connectors, air heaters, pressing irons, automobile heaters, cooking and liquid appliances, such as ranges, hot plates, water heaters, toasters, grills, elevator switches, farm lighting plants, oil-break switches, fuses—plug and cartridge, renewable and non-renewable, current taps, cut-out bases, rosettes, bell-ringing transformers, electrical soldering tools, soldering lugs, insulating devices, outlet bushings and fittings, auto-starters, washing machines, oil and gasoline pumping outfits, elevator controllers.

Method of Procedure

It is incumbent upon the manufacturer to obtain approval of the design and construction of his product before offering it for sale in Ontario. To obtain this approval, the device in question is sent to the Laboratories accompanied by a



Switch testing machine used in Hydro Laboratories—6000 openings and closings are made at full voltage and current

formal application to the Commission. The necessary tests are then carried out and the manufacturer advised of the changes, if any, which are necessary to bring the device up to standard. It is sometimes necessary to submit two or more samples before one is produced which is in accord with the requirements. When a device has finally been constructed which is considered by the Laboratory to be free from fire and accident hazard, a report is prepared describing in detail the construction of the device, the tests which were made upon it and a recommendation that it be approved.

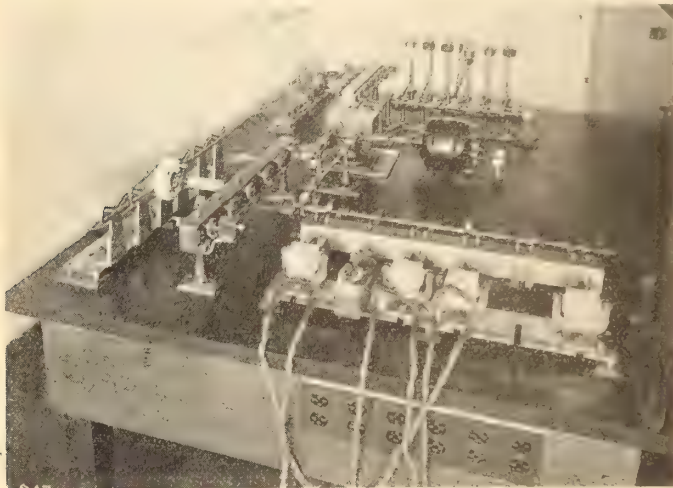
Approvals Committee

This report is submitted to each member of a committee composed of representatives of the Hydro-Electric Power

*Laboratory Director, Hydro-Electric Power Commission of Municipal Electrical Utilities of Ontario, Jan. 27, 1921.

Commission, the electrical manufacturers, dealers, jobbers and professional societies, and the fire underwriters.

The personnel of this committee is as follows: W. P. Dobson, Chairman; A. S. L. Barnes, Secretary; W. C. Cale, Approval Laboratory; Wills MacLachlan, L. G. Ireland, R. T. Jeffrey, E. M. Wood, J. F. S. Madden, Hydro-Electric Power Commission; A. G. Hall, Electrical Inspection Department, Hydro-Electric Power Commission; J. A. McKay, representing Canadian Association of Manufacturers of Electrical Supplies; C. E. Schwenger, representing Association of Municipal Electrical Utilities of Ontario; O. V. Anderson, representing Canadian Electrical Association; S. A.



Another view of Switch testing machine

Gaskell, representing Canadian Association of British Manufacturers; Joseph Rogers, representing Canadian Electrical Supply Jobbers' Association; K. A. McIntyre, representing Ontario Association of Electrical Dealers and Contractors; F. R. Ewart, representing American Institute Electrical Engineers; William Taylor, representing Associated Boards of Trade of Ontario; R. Driscoll, representing Canadian Fire Underwriters' Association.

Each member of this committee is asked to read the laboratory reports and signify his approval or disapproval. When agreement among the members of the committee has been reached the report is presented to the Commission with the recommendation that the device in question be approved for use in Ontario.

When the recommendation has been sanctioned by the Commission the manufacturer is so advised and an "approval number" is issued which serves to identify the particular device or line of devices approved. A card index of approved devices is distributed to the district inspectors of the Commission, and to others interested. This forms a continuous record for the use of the inspectors and contains sufficient information to enable them to identify any approved device which may be brought to their notice.

Re-examination

When a device has been approved, the manufacturer enters into an agreement with the Commission to manufacture all future devices in exact duplicate of the sample approved. The Commission agrees to allow its name to be placed upon the device together with the approval number mentioned above, thus signifying that it has passed the necessary tests. This is usually accomplished by placing on the name plate the abbreviation "H.E.P.C. App. No." On certain devices such as enclosed switches, cabinets, conduit, fuses, etc., labels are used. These are furnished by the Commission and are affixed by the manufacturer.

In order to keep a check on the quality of the product

of any factory, periodic tests are made in the laboratory on samples selected in the factory or purchased in the open market. A representative of the laboratory also visits the manufacturers to examine their product and render them assistance in any matter relating to approval.

By this means it is possible to keep a continuous check upon the various classes of electrical devices and to detect cases of hazardous construction.

Although the majority of the manufacturers making use of the laboratory are located in Ontario, its services have been made use of by other Canadian manufacturers and by a considerable number of American manufacturers, whose goods have not been submitted for approval to Underwriters' Laboratories. Many of these manufacturers, however, have obtained the Underwriters' approval and in such cases their goods are listed in the records of the Commission upon payment of the cost of listing, provided they also conform to the requirements of the Inspection Department. It is necessary, however, that all such goods be listed before being distributed in Ontario.

Standards

All tests on devices and materials submitted are made with reference to standards where such exist. These are specifications of the various features of construction considered necessary to minimize fire and accident hazard, and of the tests necessary to determine how the specifications have been complied with. The standards in general use in America are those based upon the National Electrical Code of the United States prepared by the National Board of Fire Underwriters, in co-operation with electrical manufacturers, inspection authorities and other interested bodies. These follow standards of construction and wiring in use in the United States and generally adopted throughout Canada.

The standards adopted by the Commission at the inception of the work agree in all essential details with those of the Underwriters' Laboratories, insofar as they relate to the fire hazard, but conform to the rules and regulations



Testing air heater at normal voltage and current

of the Commission for inside electrical installations where these differ from the National Electrical Code. These differences deal chiefly with the elimination of danger to persons from shock, a feature of inspection which until recently has not been emphasized by the underwriters.

The preparation of standards must of necessity lag somewhat behind the progress of manufacture, hence, standards are not yet available covering all classes of devices on the market.

Standards for the following materials and devices have

been promulgated by the Commission:—Rubber covered wire and cable armored cords and cable, cartridge enclosed fuses, snap switches, cabinets and cutout boxes, electric signs, panelboards, knife switches, cutout bases, soldering lugs, flexible cords, ground clamps.

These standards specify in detail the various features which are considered worthy of attention from the point of view of safe construction, such as clearance between live parts and ground and between points of opposite polarity, thickness of metal, current density, etc. They also specify dimensions of various devices such as fuses, cutout bases, screw shells, etc. Many devices are submitted for approval, however, for which no specific standards exist. Consequently the Commission has with the co-operation of the manufacturer and other interested parties, prepared standards for certain classes of materials and devices as such were found necessary. Those prepared to date are: Electric washing machines, enclosed switches, electric ranges.

Much assistance is rendered the laboratory by the Inspection Department, in reporting cases of substandard samples for laboratory examination. The various organizations represented on the Approvals Committee also co-operate in the criticism of laboratory reports and, in particular, the Canadian

Associated Manufacturers of Electrical Supplies in the work of preparing standards.

The importance of the approval testing work need not be emphasized before a meeting of the Association of Municipal Electrical Utilities. There are several self-evident facts, however, the full significance of which may not be universally realized even by the electrical fraternity. The approval testing has been referred to as supplementary to field inspection. It is in reality of fundamental importance to the latter, since safe methods of installation are of no avail without properly constructed appliances and materials. The importance of the work to the safety of the public and of property cannot be over emphasized. The fire loss from electrical causes is still large. The danger to life even in low voltage appliances has not been wholly removed. Consequently continued vigilance in the construction of materials and appliances is an essential feature contributing toward safety in the use of electricity. The growth in the use of electricity by the public at large will depend upon safe construction of appliances as much as upon economy and convenience. It is, therefore, incumbent upon all who are interested in furthering the use of electricity to co-operate in the maintenance of safe standards of construction.

The Economical Handling of Range Loads on the Distribution System

By C. E. Schwenger*

The problem of the economical handling of range loads on distribution systems is really the problem of the economical handling of 115-volt loads generally using the data concerning range load characteristics as a guide.

Range loads may fall into one of the following general classes:—

- (1) Concentrated load of several ranges on one service;
 - (2) Scattered load of few ranges;
 - (3) Heavy range loads more or less evenly distributed.
- Each class has its own problem to be solved.

Before undertaking the problems information as to the probable maximum demand on a single range as well as the maximum demand on a group of ranges together should be at hand. Knowledge of the probable maximum demand will enable us to determine the transformer capacity required to supply the expected load.

Usually the maximum demand of the range or group of ranges will be less than the connected load of the range or group of ranges. The ratio is called Demand Factor which may be defined as follows:—

The Demand Factor of a section is the ratio of the maximum demand on this section to the connected load on the section.

Tests conducted by the writer show that where a group of ranges greater than ten is being supplied, a demand factor of about 33 per cent. is obtained. Thus for every 100 kw. connected in ranges lamps and appliances a maximum demand of 33 kw. may be expected.

This demand factor was obtained from the following test data:—

Tests			
	Section A	Section B	Section C
Length of section	700 ft.	800 ft.	
No. of Consumers	34	38	17
No. of Ranges	17	1	none
Connected load ranges	105.5 kw	1.5	none
Connected load other than ranges (estimated)	25.0 kw	28.5	1
Total connected load	130.5 kw	151.5	1

*To be read before the convention of the Association of Municipal Electrical Utilities of Ontario, Jan. 27-8.

Maximum Demands (Daily):—			
Friday	5.20 p.m.	36.2 kw	Tues. 21.2
Sat. and Sun.	5.55 p.m. Sat.	26.0 kw.	Wed. 40.0
Monday	5.15 p.m.	43.7 kw.	Thur. 33.0
Tuesday	5.30 p.m.	43.5 kw.	Fri. 42.5
Wednesday	5.30 p.m.	35.5 kw.	Sat. 34.6
Thursday	5.25 p.m.	37.0 kw.	Sun. 20.0
Friday	6.00 p.m.	42.0 kw.	Mon. 47.0
Saturday	5.30 p.m.	28.0 kw.	
Sunday	6.00 p.m.	21.0 kw.	
Greatest for week		43.7 kw.	47.
Demand Factor		33.3%	31.5
Date of Tests	Dec. 1920		Dec. 1920

The typical curve "A" shows that the period over which the maximum demand takes place lasts less than one hour, and takes place between five and six p.m. The chart is typical for conditions in large cities such as Toronto. This demand includes lighting and appliance load as well, and the lower curve "B" shows the lighting and appliance load only. This latter curve was secured on Test Section C which has no ranges but has the same class of consumer. The range peak and the lighting load overlaps on the date in question which is one early in December. (See curves p. 31).

In smaller towns, where the noon meal is the most important of the day, it is likely that the range peak would occur between the hours of 11 a.m. and 12 noon. This peak would not overlap the lighting load but might overlap a small appliance load as shown. The maximum demand on any section would, therefore, be somewhat smaller than for a similar section in a large city.

Thus for concentrated load of several ranges,

(General Class No. 1) Covering such loads as apartment houses. Knowing the connected load in ranges and other devices, we should install a transformer of size capable of handling a demand of 33 per cent. of the connected load. The typical curve shows the demand to be of short duration. For such short periods transformers can easily carry 50 per cent. overload, therefore to carry the above load, transformers rated at two-thirds of the maximum demand may be used, which on the above example, would permit of the connected load.

The rule might be stated that transformer capacities of 20 per cent. of connected load should be installed as a mini-

mum for the purpose of carrying range loads. The transformer should be installed as near the load as possible which for apartments would be near the service entrance.

Class II. Scattered load such as older built up districts where a few ranges here and there are to be handled. The maximum demand for a single range is approximately 50 per cent. of its connected load. Thus for a 5 kw. range the demand would probably be $2\frac{1}{2}$ kw. Usually secondary lines laid out for general lighting could handle one or two ranges in addition without installing extra transformer capacity. This is on account of the slight overlap of the two loads. Voltage regulation may enter into the problem and it may be necessary to change the location of the transformer to a point closer to the range loads under consideration. This will depend on local conditions which will have to be considered for each individual case.

Class III. Heavy range loads more or less evenly distributed along a street. Let us assume the load as evenly distributed for the purpose of calculation. Let us also assume the distribution to be at 115/230 volts, 3-wire and that primary wires are available along the street so that this latter item may be neglected in the calculations.

From the data on hand we find that we may expect a maximum demand per thousand feet of secondary lines of 75 kw. Taking Test Section "A," out of 34 consumers on 700 feet of line, we get a demand of 43.7 kw. which is equal to 62 kw. per thousand feet of line. Here, however, one out of every two consumers now has a range. This ratio might easily become larger later. Therefore, the estimate of 75 kw. per thousand feet does not appear to be too high.

The problem now is to decide on the size of secondary wires, and the transformer spacing, to obtain the most economical condition.

Taking No. 6, No. 4, No. 2, No. 0 and No. 3/0 as standard conductors, and working out the total annual charges per thousand feet of secondaries including transformers, and also the annual energy loss costs, the three following tables have been obtained. Annual charges for secondary copper is figured at 10 per cent. and includes interest depreciation and sinking fund. Similarly the rate on transformers is figured at 13 per cent. Energy loss in secondary wires and transformer copper is figured at 1 cent per kilowatt hour. Transformer core loss is included in transformer annual cost. This, however, does not affect result if omitted.

By transformer spacing is meant the distance between transformers on a secondary if the transformers are banked. If not banked the transformer spacing will become the distance between the ends of the secondary section having the transformers in the centre. The energy loss is assumed to be that due to the use of the peak load for $1\frac{1}{2}$ hours, see Curve "A," and as being equivalent to the average daily loss over a yearly period.

Annual Charges Per Thousand Feet of Secondary Circuit Load—75 kw.

Table I.—800 ft. Transformer Spacing
Annual charges per 1,000 ft. of secondaries

Wire Size	Annual Car-rying Chgs.	Sec. Cu. Loss	Transf. Cu. Loss	Transf.	Drop at 230 V.	Total Carrying Charges
6	13.67	24.50	4.93	13.13	25.6	181.23
4	19.55	15.45	4.93	138.13	16.4	178.06
2	26.21	9.67	4.93	138.13	10.2	179.94
0	40.57	6.08	4.93	138.13	6.1	189.73
3/0	65.52	3.85	4.93	138.13	4.1	212.43

Table II.—1,000 ft. Transformer Spacing
Annual charges per 1,000 ft. of secondaries

Wire Size	Annual Car-rying Chgs.	Sec. Cu. Loss	Transf. Cu. Loss	Transf.	Drop at 230 V.	Total Carrying Charges
6	13.67	38.50	4.93	120.00	30.0	177.10
4	19.55	24.22	4.93	120.00	20.0	168.70
2	26.21	15.20	4.93	120.00	12.5	166.21
0	40.57	9.55	4.93	120.00	7.9	174.05
3/0	65.52	6.04	4.93	120.00	5.0	195.49

Table III.—1,200 ft. Transformer Spacing
Annual charges per 1,000 ft. of secondaries

Wire Size	Annual Car-rying Chgs.	Sec. Cu. Loss	Transf. Cu. Loss	Transf.	Drop at 230 V.	Total Carrying Charges
4	19.55	34.70	1.83	115.92	29.	175.00
2	26.21	21.68	1.83	115.92	18.3	168.64
0	40.57	13.70	4.83	115.92	11.4	175.02
3/0	65.52	8.14	1.83	115.92	7.2	194.41

From these tables it is evident that lowest annual fixed charge is for No. 2 wire having 1,000-foot transformer spacing. This is, therefore, the most economical. This combination gives a maximum voltage drop of 11.5 or 5.4 per cent. which is not excessive. If better voltage regulation than this is required, let us take No. 0 wire having 1,000-foot spacing. This gives a voltage drop to 7.9 or 3.6 per cent. at annual fixed cost of \$175.05.

Now let us see what we get with other transformer spacings for this annual outlay. The best in Table No. 1 is \$178.06 but voltage drop is 16.4 or 7.1 per cent., and therefore not as good as No. 0 with 1,000-foot spacing. The best in Table No. 3 is No. 0 at 175.02 per year but drop is 11.4 volts or 5 per cent. which also is not so good as No. 0 in Table 2.

It would, therefore, be good policy to adopt No. 0 secondaries with transformers at 1,000-foot spacing as for the slight annual extra outlay better voltage regulation is obtained.

The above has been outlined in some detail to show the method of obtaining the most economical conditions.

Similar tables may be worked out to find the most economical layout for other load densities if this were wanted.

In laying out new lines for districts where the load will later on reach a density of 75 kw. per 1,000 feet, it is best policy to install the secondary copper of size sufficient to carry the ultimate load, No. 0, but to provide only sufficient transformer capacity on 1,000-foot spacing to carry the immediate demands, and later change the transformers to greater capacity as the load increases.

This is more economical than to install secondaries of smaller capacity with the idea of later changing both secondaries and transformers as the load demands it. This is on account of the heavy charge for replacing secondary wires, and also on the loss in capital value of the wires recovered.

Take for example that—

Present demands warrant No. 4 secondaries. Annual charges for this wire, \$19.55.

As above No. 0 should be installed as ultimate size. Annual charge for No. 0 wire at 1,000 ft. spacing is \$175.02. Outlay \$21.00

Now cost of changing No. 4 secondaries per 1,000 feet equals approximately for labor \$100.00

[It must be remembered that service wires have to be disconnected and again reconnected to No. 0 lines.]

Original cost of putting up No. 4, Labor..... 32.17
Extra—Depreciation on wire due to its having been cut into, etc., estimated at 40.00

Total cost \$172.17

Thus if change is to be made in less than eight years it will pay to put up No. 0 in first instance as the extra annual outlay over No. 4 would in 8 years amount to \$168.00 which is approximately the cost involved in later changing the wire sizes. If sizes closer together such as No. 4 and No. 2 are compared, it will be found uneconomical to make the change in less than 24 years.

Annual charges No. 4 19.55
Annual charges No. 2 26.21

Extra annual charge 6.66
Costs to change wires later (approx.) 90.00
Original cost of No. 4 labor putting up (approx.) 32.17
Extra depreciation estimated 40.00

Thus if a change is made in less than eight years it will pay to put up No. 0 in first instance as the extra annual outlay over No. 4 would in 8 years amount to \$168.00 which is approximately the cost involved in later changing the wire sizes. If sizes closer together such as No. 4 and No. 2 are compared, it will be found uneconomical to make the change in less than 24 years.

annual energy losses, but it is readily seen that the losses for the smaller wire will be the larger thus tending to increase the time period under which it would be uneconomical to change wire sizes.

The writer has introduced this feature to show that good economy results by putting up at once the wire size corresponding to the ultimate requirements, unless the ultimate load will take many years to develop.

General Remarks

For range loads continuity of service is of prime importance even more than for lighting only. In pure lighting loads, if an interruption takes place, some other source of lighting such as candles, oil lamps, etc., may be resorted to without great inconvenience to temporarily tide over the emergency. This is not so with electric ranges where these are used exclusively as is generally the case.

The writer would recommend that ranges be connected for 3 wire operation and that secondary lines be supplied by transformers connected in series, that is, to obtain 115/230 volts, two transformers each connected for 115 volts in series across the secondary lines. In case of transformer trouble, if one transformer is interrupted through any cause, only one side of the secondaries is affected, the other side will be in operating condition, and one-half of every range may still be used. Thus only a partial inconvenience results for the consumer until such time that the necessary emergency work on the transformer in trouble may be done.

The cases taken above are for winter conditions when range loads lighting, and appliance loads overlap slightly and thus become maximum conditions. These of course are the ones for which to lay out the lines. This overlapping takes place only during, at most, three winter months. During the balance of the year the loads do not overlap and, therefore, the maximum demands would be smaller. This is a desirable condition as, the transformers then have a higher normal operating temperature and a somewhat less overload capacity.

The annual general meeting of the shareholders of the Toronto and York Radial Railway Company for the election of a Board of Directors and the transaction of other business connected with the undertaking will be held at the head office of the company, Toronto Railway Chambers, at 11.30 a.m. on Wednesday, February 2nd, 1921.

Convention of Municipal Electrical Utilities of Ontario, Jan. 27—28, 1921

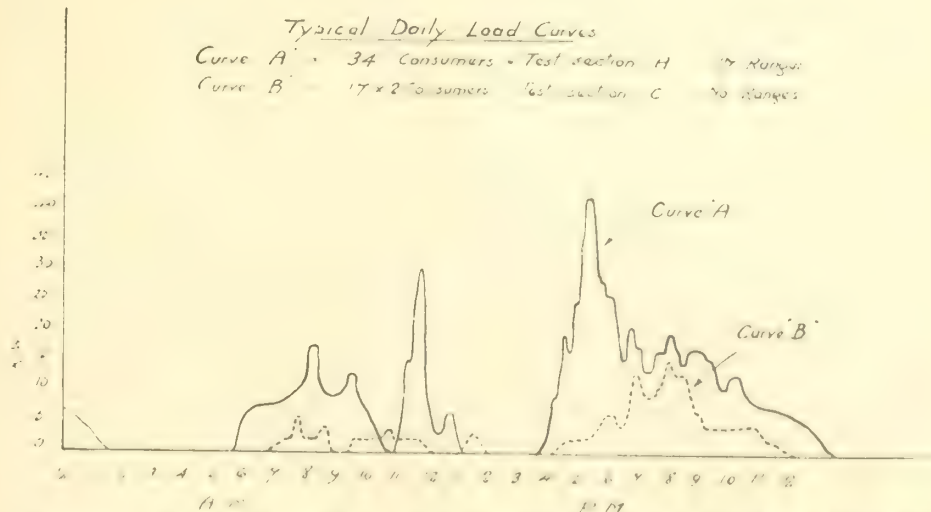
Final attention is drawn to the convention of Ontario's municipal electrical engineers to be held in Toronto on the 27th and 28th of this month. In addition to the regular program, the dinner on the evening of the 27th, which is to be held at the Carls-Rite, will be addressed by Hon. I. B. Lucas, member of the Hydro-electric Power Commission of



Mr. Oswald H. Scott, President

Ontario. Another feature of the convention will be a visit to the Strachan Avenue laboratories of the Ontario commission. Opportunity will be given during the forenoon of either the 27th or 28th of inspecting the laboratories, when Mr. W. P. Dobson and his staff will be in attendance to give all possible information and answer any question the delegates may be disposed to ask.

Attention is also drawn to the fact that as this is the annual meeting the election of officers for the coming year will take place.



Progress of Extensions to the Municipal Hydro-Electric Plant of the City of Winnipeg

By E. V. Caton, M.E.I.C.*

The Hydro-electric plant of the city of Winnipeg, situated at Point du Bois on the Winnipeg River, 78 miles north-east of Winnipeg, has already been described in the technical press in so far as the original installation completed in 1911 is concerned. Since then the plant has been increased from time to time by the installation of additional units, until the capacity of the original building was taken up.

The present article is intended to briefly describe the extension now being completed to the buildings, which will enable the installation of double the number of existing units to be proceeded with.

The original installation consisted of a rock-filled dam, concrete dam and spillway, intake works and part of the power house building.

The power house building is built as part of the dam, the up-stream wall containing the wheel pits, the draught tubes being situated below the power house floor and discharging directly into a bay below the falls. The complete design called for sixteen wheel pits and an exciter wheel bay.

The first installation consisted of the completion of eight wheel pits and draught tubes, exciter bay and power house building completed to take care of eight machines, two water wheel driven exciters and the necessary transformers and switching; the up-stream wall being completed sufficiently to act as a dam, openings being left for the wheel pits, which were temporarily closed by sheathing on the rack structure in front of pits, placing stop logs in the openings and a wing dam at the temporary end of the completed building.

Five machines, each of 5,200 h.p. (Maker's rating), and two exciters, each of 400 h.p. (Maker's rating), were installed, together with two banks of transformers, each of 9,000 k.w. Later on three 6,800 h.p. machines were installed and one 9,000 k.w., three phase transformer, thus taking up all available space.

In 1917 the draught tubes were completed for the remaining eight wheel pits, but no superstructure was built.

In 1920 the contract was let for the completion of the power house building. The work consisted of extension to the generator room 268 feet long, 63 feet wide and 50 feet high and the roofing in of the turbine floor, gate house and rack structure.

For obvious reasons the design followed very closely that of the first installation, with slight variations from it, which had been found necessary in the operation of the plant.

*Chief Engineer, City Light and Power, Winnipeg.

The generator room will house eight 7,000 h.p. units, two 18,000 k.w. transformer banks and the necessary switching and control apparatus. At the extreme end is provided an unloading bay and room for machine shop, oil storage and office. The construction is partly structural steel and partly reinforced concrete.

All concrete is either 1, 3, 5 or 1, 2, 4, the aggregate being crushed granite obtained from a quarry situated within $\frac{1}{4}$ mile of the work. Sand was obtained from a pit situated on the department's railroad, within 4 miles of the plant. Most of the lumber for form work was obtained from a local lumber mill.

The main contractors were Messrs. Thos. Kelly and Sons, Winnipeg. The steel contractors were the Dominion Bridge Company.

The completed building will be as shown in Fig. —and will house a plant having a capacity of over 100,000 h.p.

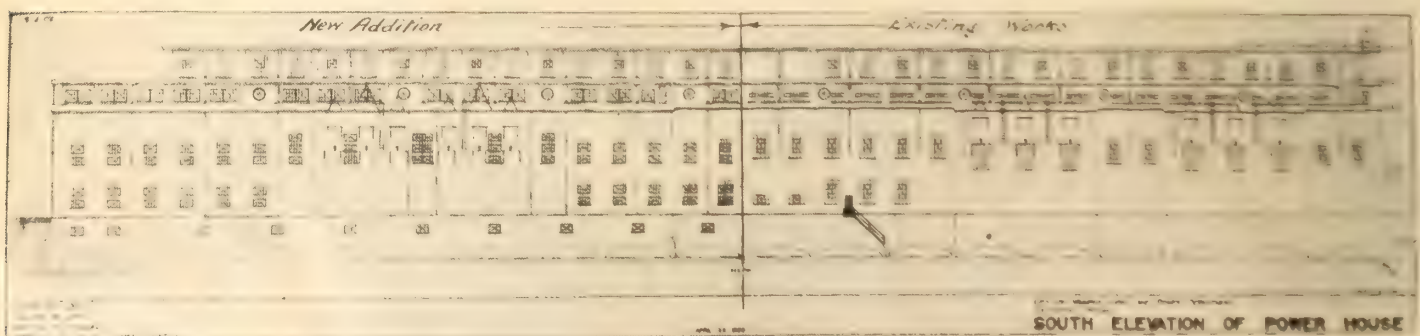
The estimated cost of the completed work now being undertaken is \$300,000.00.

Owing to the unsettled conditions of the labor and material market when contracts were called for, it was felt that it would be impossible to secure satisfactory contracts on the usual basis and it was therefore decided to call for tenders on a cost plus basis. Specifications were therefore called for on a basis of cost plus with fixed maximum cost of the work; a bonus being paid for any reduction in cost below this and a penalty for any cost above this. The following quotation from the specification gives the exact terms under which the contract was let:

"The tenderer shall quote a lump sum price for the material and labor actually entering into the completion of all the work called for and listed in this specification. On this sum the city will pay the successful tender twelve (12%) per cent to cover his profit and expenses, this percentage to cover the supplying of all apparatus, machinery, tools, equipment, superintendent, office expenses, and general organization, including all items other than the cost of material and labor, actually entering into the completed work called for under these specifications, it being understood that the wages of foremen and sub-foremen actually engaged upon the work may be included under the cost of labor.

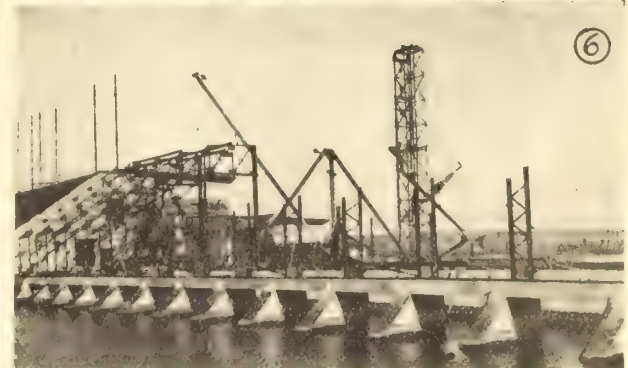
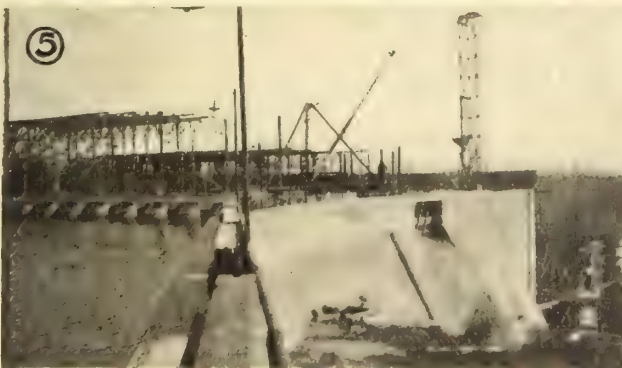
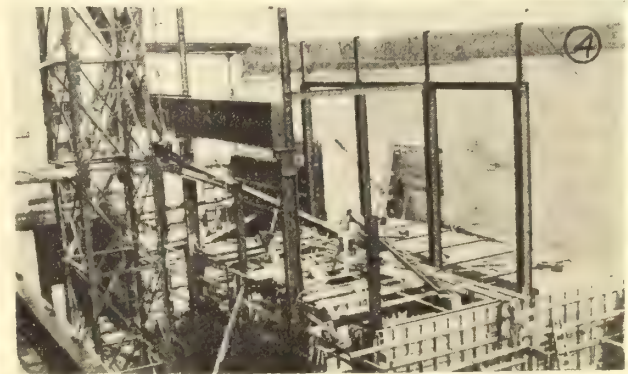
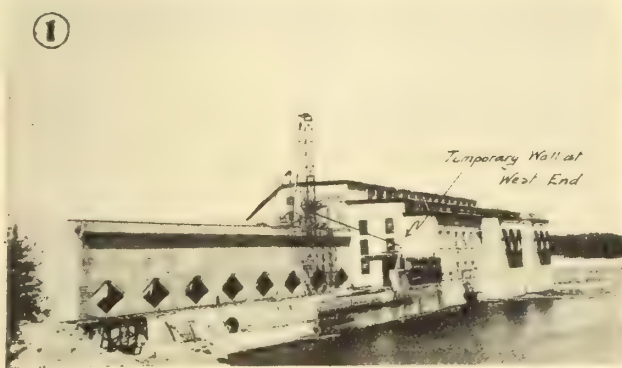
No percentage will be paid to the contractor on any sum in excess of his lump sum bid.

Should the actual cost of the work be over and above ten (10%) per cent. in excess of his lump sum bid the contractor shall be penalized on all such excess cost as follows



South elevation of power house showing existing plants and extensions

Winnipeg Municipal Generating Plant Extensions



1. View at commencement of work.

2. Form work and trestle for generator room floor.

3. Turbine room floor

4. Generator room steel.

5. View looking down stream showing steel work on gate room and turbine room floor.

6. View of gate room floor looking down stream.

7. View of work as it appeared about Dec. 1, 1920

8. General view during construction.

Twenty-five (25%) per cent. of all sums in excess of ten (10%) per cent. and less than fifteen (15%) per cent.

Fifty (50%) per cent. of all sums in excess of fifteen (15%) per cent. in addition to the twenty-five (25%) per cent. mentioned above, as per sample:

Example

Lump sum bid	\$100.00
Actual cost	130.00
Penalty: 25% on \$ 5.00	7.50
50% on \$15.00	\$1.25
	<hr/> \$8.75

Should the cost of the work be less than the lump sum bid the contractor shall receive twelve (12%) per cent. on the lump sum bid together with twenty-five (25%) per cent. of the difference between the actual cost of the work and his lump sum bid.

For the purpose of estimating the sum due to the contractor, he shall submit with his bid unit prices on all of the material listed and called for.

The lump sum bid by the contractor shall be based on and shall agree with the quantities listed in his tender under the unit prices submitted by him under alternative (2).

Since the quantities given in this specification are not guaranteed to be absolutely correct, in the event of any variation between these quantities and the finished work, the lump sum bid on which the percentage shall be paid will be adjusted on the basis of the unit price under alternative (2).

For all work unlisted in these specifications and which will be done on force account, the contractor will be paid cost plus twelve (12%) per cent., the basis for settlement being the same as for day labor work under the unit price basis. Such sums shall not be considered when estimating the "lump sum price" under the cost plus basis.

The following items will be paid by the city but no percentage will be paid on same, nor must they be taken into account when estimating the lump sum bid.

1. All charges in connection with Employers' Liability Insurance Act.
2. Transmission of men from Winnipeg or intermediate points provided that such men remain at least one month continuously on the job.
3. In the event of labor conditions being such that it is necessary to pay the board of men employed on the job, the city will pay up to \$7.00 per week per man. All sums in excess of this amount to be paid by the contractor.
4. All cost of maintenance and repairs of tools and equipment must be paid for by the contractor out of his 12%.

Commission of Conservation to Give Lectures on Town Planning, Housing, Water-Powers, Hydro-Electric and Allied Problems

In accordance with its fixed policy, the Commission of Conservation, which has been investigating Canada's natural resources for the past eleven years, is now aiming to utilize the services of its expert staff in the most effective manner to assist university teaching, and has arranged to give lectures on town-planning, housing, water-powers, hydro-electric and allied problems at McGill, Toronto, Manitoba, Saskatchewan, Alberta, British Columbia, Dalhousie, Acadia and Fredericton universities, which can be attended by all who are interested in any of these subjects.

The lectures on town-planning and housing will be delivered chiefly by the Commission's adviser, Mr. Thomas Adams. The lecturer on water-powers and hydro-electric and allied problems will be Mr. Arthur V. White, the Commission's engineer, who is recognized as an authority on Can-

ada's fuel problem and on the development of the water-powers of the St. Lawrence and Niagara rivers. These lectures will be given during the current season.

Develop Power at Otto Lake

A scheme is under way to develop water powers at Otto Lake, a very short distance west of Swastika Station. Between 750 and 1,000 horse-power would be raised. The promoters, who are said to be a Toronto group, are applying to the township of Teck for a franchise to transmit and sell power in that township, which embraces the producing mines. It is understood that a lease has been secured on the power and that work is to be started immediately the township gives its consent to the scheme. The power has quite a large drainage area back of it, including Sesekinika Lake, and other lakes of almost similar size.

Bound copies of the proceedings of the Annual Convention of the Canadian Electrical Association, which was held in Montreal on June 16th and 17th, 1920 are now ready for distribution. The office of the association has been moved to 601 Power Building, Montreal.

More About Customs Classification

St. Catharines, Ont.

Editor, Electrical News:—

Your letter of the 17th of December at hand, and the writer has carefully gone over the classification of electrical material imported into Canada, and believe these to be very well classified.

We might, however, suggest that transformers be subdivided as follows:—

- (a) Power and furnace transformers.
- (b) Lighting transformers.
- (c) Instrument transformers.
- (d) Bell ringing and toy transformers.

Yours very truly,

The Packard Electric Company, Limited.

Frank T. Wyman, President.

P.S.—We are wondering if the drink mixers mentioned as being imported from the States are not all second-hand.

* * *

Montreal, Que.

Editor, Electrical News:—

We are in receipt of yours of the 17th, with reference to matter of statistical information regarding the operations of the electrical industry and I have also noted the classification as shown in your last issue by Mr. Johnston of the Northern Electric Co. While along general lines, the classification might be alright, still it shows too clearly it is simply a compilation of electrical items taken out of an alphabetically arranged price book.

The correct classification ought to be along distinct lines of groups and to my mind it is not a correct thing to show an electric iron under "E"; then an egg boiler; and something else under heading of "cooking devices" under another alphabetical heading. The correct designation would be "Heating and Cooking Appliances."

Same thing applies right throughout the whole classification.

Yours truly,

International Machinery & Supply Co. Ltd.

R. J. Hiller, Mgr., Electrical Dept.

Mr. Chas. Baetz of Baetz Bros., manufacturers of electrical equipment, Kitchener, Ontario, has been elected for the second consecutive time as alderman of the city.

Engineering Legislation for Ontario

Text in Full of Draft Bill Prepared by the Advisory Conference Committee, Representing Electrical, Civil, Mechanical and Mining Engineers, and Approved by the Toronto Sections of the A. I. E. E. and E. I. C.

AT the forthcoming session of the Ontario Legislature, the engineers of the province will endeavor to secure legislation. The draft act is already in shape, having been finally formulated by the Advisory Conference Committee on Engineering Legislation. This Committee was organized to consider the question of Engineering Legislation for the Province of Ontario. At the time of formation it was understood that the function of the Committee was advisory only, and that it should report back to the constituent bodies.

The Committee was formed of the following members, who were appointed to it, by the organizations indicated: Engineering Institute of Canada (Ontario Provincial Division), J. B. Challies and Willis Chipman; Canadian Mining Institute, Clifford E. Smith and James McEvoy; American Institute of Electrical Engineers (Toronto Section), F. R. Ewart and R. R. Stevenson; American Society of Mechanical Engineers (Ontario Section), C. B. Hamilton and Prof. R. W. Angus; Canadian Institute of Chemistry; Prof. J. Watson Bain and E. R. Ardagh; Ontario Association of Architects, J. P. Hynes and Forsey Page; Association of Ontario Land Surveyors, T. D. LeMay and Col. A. Van Nostrand.

At the first meeting of the committee the following officers were elected: Chairman, Clifford E. Smith; vice-chairman, Willis Chipman; secretary, F. R. Ewart.

Eight meetings of the committee were held on March 12 and 27, April 19 and 24, July 19, October 9, November 26 and December 8, 1920. In addition to these there were many sub-committee meetings on drafting of the proposed bill. The bill was passed through six draftings before reaching the present form. It will be seen from this that the work of the Committee has been thorough, and all points have been fully considered and discussed. While the bill may not be perfect, it should not be at fault in any serious point of principle.

Architects Withdraw

Towards the conclusion of the work, the Ontario Association of Architects withdrew from the scope of the bill, as they reached the conclusion that their interests would be better served by securing independent legislation.

The main features of the bill are as follows:

1. It follows closely along the lines of legislation already enacted in the Provinces of British Columbia, Alberta, Manitoba, Quebec, New Brunswick and Nova Scotia. For this reason reciprocal privileges between these provinces and our own should be much easier than if our legislation were on radically different lines.
2. It places the control of engineering in the hands of the profession itself, thereby avoiding control by Government officials who may lack full understanding of our diversified needs.
3. The Government will have a share in choosing the personnel of the Council, thus providing a guar-

antee that the Council cannot be controlled by any particular group.

4. The different branches of engineering are given equal representation, so that no one branch can gain control.

5. The branches are made partially autonomous, so that their regulations may vary from one another in matters requiring such variation. At the same time the Council has power to prevent these variations becoming too extreme.

6. The legislation is intended to cover engineering only. Technical trades and similar occupation cannot be brought within its scope. It is only by remaining distinct from these that engineering can attain full professional status.

7. Provisions for registration of present practicing engineers are made reasonably broad, so that nobody with fair pretensions will be debarred from his present livelihood.

The Committee feels that these features should prove acceptable to every professional engineer in Ontario. Other styles of legislation may have points in their favor, but the above considerations were considered to be of more importance.

The Committee hopes that every engineer will consider the draft bill from the standpoint of broad, general principles, and lend his hearty support to it, if found satisfactory in this regard. It will never be possible to get every minor detail adjusted to the full satisfaction of all concerned. To give consideration and effect to all the petty amendments and alterations which might be proposed, would effectively prevent the matter ever being brought to an issue.

The draft bill follows:

"An Act Respecting Professional Engineers"

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

Short Title

1. This act may be cited as the "Professional Engineers' Act."

Interpretation

2. In this act, unless the context otherwise requires, the expression—

- (a) "The Association" means the Association of Professional Engineers of the Province of Ontario.
- (b) "Council" means the Executive Council of the Association.
- (c) "Member" means a Registered Member of the Association.
- (d) "President" means the President of the Association.
- (e) "Vice-President" means the Vice-President of the Association.
- (f) "Registrar" means the Registrar of the Association.
- (g) "Secretary" means the Secretary or Secretary-Treasurer of the Association.

(h) "Board" Means the Board of Examiners of the Association.

(i) "Registered" means that an Engineer has been admitted to membership in the Association and that his name has been enrolled in the Register; and "Certificate of Registration" means the official certificate under the seal of the Association evidencing the same.

(j) "Licensed" means that permission has been granted by the Council to a non-resident professional engineer to practice temporarily without being registered, and "License" means the official certificate under the seal of the Association evidencing such permission.

(k) "Professional Engineering" means the advising on, the reporting on, the designing of, the supervising of the construction of, the appraisal of: All public utilities, industrial works, railways, tramways, bridges, tunnels, highways, roads, canals, harbor works, harbors, light houses, river improvements, wet docks, dry docks, floating docks, dredges, cranes, drainage works, irrigation works, water works, water purification plants, sewerage works, sewage disposal works, incinerators, hydraulic works, power transmission, steel, concrete and reinforced concrete structures, electric lighting systems, electric power plants, electric machinery, electric apparatus, telephone systems, telegraph systems, cables, wireless plant, mineral property, mining machinery, mining development, mining operations, gas and oil development, smelters, refineries, metallurgical machinery, and equipment and apparatus for carrying out such operations, machinery, steam engines, hydraulic turbines, pumps, internal combustion engines and other mechanical structures, chemical and metallurgical machinery, apparatus, and processes, aeroplanes, air ships, and all other engineering works.

The execution by a contractor or his assistants of work designed by a Professional Engineer, or the direction of work as otherwise defined in this clause by a superintendent of construction, or superintendent of maintenance, or their subordinates, when working from designs, or upon advice of a Professional Engineer, shall not be deemed to be the practice of Professional Engineering within the meaning of the Act.

The Association

3. (a) All persons Registered as Professional Engineers, under the provisions of this Act shall constitute the "Association of Professional Engineers of the Province of Ontario" and shall be a body politic and corporate, with perpetual succession and a common seal.

(b) The head office of the Association shall be at the City of Toronto, Province of Ontario.

(c) The Association shall have power to acquire and hold real or personal property not producing at any time an annual income in excess of \$10,000, and to alienate, mortgage, lease, or otherwise dispose of such property or any part thereof as occasion may require.

(d) All fees and fines and penalties receivable and recoverable under this Act shall belong to the Association.

By-Laws

4. The Association may pass by-laws not inconsistent with the provisions of this Act for: (a) The election of "Council"; (b) the government and discipline of the members; (c) the management of its property; (d) the appointment of such officers as may be necessary for carrying out the purposes of the

Association; (e) the maintenance of the Association by levying and collecting the necessary fee from each member and licensee, which fee shall not exceed \$10 per annum; (f) the admission of candidates to practice; (g) the keeping of the "Register"; (h) fixing dates and places of meetings of the "Association"; (i) all such other purposes as may be deemed necessary or convenient for the management of the Association, or the conduct of its business.

5. No by-law of the Association or amendment thereto shall be valid or take effect until approved by the Lieutenant-Governor-in-Council.

Classification

6. (a) For purposes of representation upon the Council and for Registration, and for such purposes only as are hereinafter set out, membership of the Association shall be divided into the following branches: civil engineers, mechanical engineers, chemical engineers, electrical engineers, mining engineers.

(b) Each member admitted to the Association may register in all Branches, for which he can submit credentials satisfactory to the authority governing admission to each of such Branches. He shall, however, vote in only one such Branch according to his own selection, but may transfer his vote to some other Branch, in which he is registered, upon the approval of the Council.

7. Additional branches may be established by the Lieutenant-Governor-in-Council upon the petition of not less than 100 Registered Members of the Association, provided such petition be approved by the "Council," or upon petition of 200 members of the Association if such approval be not obtained.

Administration

8. (a) The Council shall consist of a President, a Vice-President, an immediate Past President, and three Councillors from each branch of the Association, all of whom shall be Registered Members of the Association.

(b) The President shall be elected annually by vote of members and shall hold office until his successor is elected. He shall act as presiding officer at the meetings of the Council and of the Association, voting only when the votes are evenly divided. On his retirement he shall hold office as Councillor for the next year succeeding.

(c) The Vice-President shall be elected annually by vote of members, and shall have all the powers of the President during the absence of the latter.

(d) Two Councillors shall be elected annually from each branch of the Association by the vote of the registered members in such branch, and one Councillor from each Branch shall be appointed by the Lieutenant-Governor-in-Council.

(e) The Council shall appoint a Registrar and a Secretary who shall hold office during the pleasure of the Council.

9. (a) The Members of the Council representing each Branch shall control, subject to the terms of this Act, the conditions for registration and for licensing in such Branch; including credentials, examinations and exemptions.

(b) The Council as a whole shall have the power to review the establishment of and the carrying out of the conditions for Registration as administered by the representative Councillors from all branches, and shall have the power to require the representatives of such branches to modify their administration in order

to maintain a standard of qualification in Members satisfactory to the Council.

(c) The revocation of certificates and reissuing of such certificates, the questions of discipline, fines, suspension, expulsions, finance, overlapping of practice in branches, and all matters not coming within the provisions of sub-section (a) shall be dealt with by the council as a whole.

Registration Within One Year.

10. (a) Any person residing in the province of Ontario at the date of the passing of this act, who has been engaged in professional engineering for five or more years, shall be entitled to be duly registered as a member of the association without examination, provided that such person shall produce to the council, within one year of the passing of this act, satisfactory credentials of having been so engaged.

(b) Any person residing in the province of Ontario, not qualified as in sub-section (a) above, may make application for membership in the association and shall successfully pass such examination as shall be prescribed by council, or submit credentials satisfactory to the council to be admitted to membership.

(c) Any person who applies for membership in the association within one year from the passing of this act shall submit to the council with his application a statement giving a summary of his professional career, which statement shall be made upon the forms prescribed by the council.

(d) The council may require the applicant for membership to prove the correctness of the statements made in his application, by attesting by oath or by affidavit.

(e) If the evidence of professional employment for five years, as submitted by the applicant, be considered satisfactory by the members of council representing the branch to which admission is desired. He shall be admitted to membership in the association without examination and the registrar shall issue a certificate of registration to applicant and enter his name in the register.

(f) Any person duly authorized and registered as an Ontario land surveyor at the date of the passing of this act shall be entitled on application within one year of the passing of this act to be admitted as a member of the association in the branch of civil engineers.

11. If the applicant for membership has been engaged for less than five years at professional engineering at the date of the passing of this act he shall submit certificates and proofs respecting the period of his employment to the date of his application and the members of council, representing the branch to which admission is desired, will determine from the evidence so submitted the period of such employment.

Registration After One Year.

12. Any person resident in the province of Ontario who has applied for membership in the association within one year from the passing of this act, who has not been admitted under the provisions of Section 10, shall file with the secretary a notice setting forth his employment and the name of his employer, which notice shall be filed annually during the term necessary to complete the five years of employment, at the termination of which term he shall be admitted to membership, without examination.

13. (a) Any person who applies for membership in the association after one year from the passing of this act shall submit to the council with his application

a statement giving a summary of his professional career, as an engineer, which statement shall be made upon the forms prescribed by the council.

(b) The council may require the applicant for membership to prove the correctness of the statement made with his application by attesting by oath or by affidavit.

(c) If the evidence of professional employment for not less than six years, as submitted by the applicant, be considered satisfactory by members of council representing the branch to which admission is desired, the applicant shall be admitted to membership after successfully passing the prescribed examination in the theory and practice of such branch of engineering or in lieu of such examination, upon submission of credentials satisfactory to the members of council representing such branch and to the council as a whole.

(d) An applicant who is required to successfully pass an examination may select any one or more branches of engineering for his examination.

14. Any resident of Canada who may come to reside in the province of Ontario, and who at the time is a duly registered member of an association of professional engineers, in any province of the Dominion of Canada, similarly constituted to this association, may upon application made to council, be admitted to membership, upon producing a certificate of membership in such province.

15. Any person who comes to reside in Ontario who is a registered member of any association or institute in other parts of the British Empire or in the United States, similarly constituted to this association, and which grants reciprocal privileges, and who applies for membership in this association, may be admitted to membership upon producing to council a certificate of membership in such association or institute.

Graduates

16. (a) Any graduate in any branch of engineering from any university recognized by the council upon presenting evidence of graduation satisfactory to the council will be granted, as part of his term of employment, the actual time of instruction in such university, this total not to exceed four years, and such graduate will not be required to submit to a written examination.

(b) Graduates or undergraduates of recognized engineering colleges or bona fide assistants serving under articles may during the remainder of their respective periods required for registration be engaged in professional engineering as defined in this act under the guidance of professional engineers who assume full responsibility for their work, but shall not be classed as professional engineers until registered as members of the association as provided in this act.

(c) Such graduates, undergraduates, or assistants serving under articles may, during their respective engineering courses or terms of service, be recorded with the association, and such graduates, undergraduates, or assistants serving under articles shall be subject to the control of the council as provided in this act and to the by-laws of the association, but shall not be members of the association.

Licensing

17. (a) Any person not residing in the province of Ontario who is a registered member of an association of engineers similarly constituted of any other province of the Dominion of Canada, may upon application obtain from the registrar a license to practice

as a professional engineer in the province of Ontario upon production of evidence of his registry in such other province.

(b) Any person who is not a resident of Canada, but who in the opinion of the members of council in any branch is recognized as a consulting specialist in such branch of engineering, and has not less than ten years of experience in the practice of his profession, or who presents credentials to satisfy such members of council that he has equal qualifications with those required for registration in such branch of the profession, may, with the approval of the members of council of such branch be granted a license to practice in that branch.

(c) Any professional engineer who is a resident of some other province of Canada in which there is no association of engineers similarly constituted, may obtain a license to practice in a branch of engineering subject to the approval of the members of council representing such branch.

(d) In the event of any such person mentioned in this section being unable by reason of emergency or neglect on the part of the registrar, or for any other good and sufficient reason, to obtain such license within three (3) months of his making application therefor, he shall be entitled to practice as a professional engineer in the province for such period of three months without holding such license.

18. (a) Any person who is employed as a professional engineer by a public service corporation, public utilities or government department, who is by reason of his employment required to practice as a professional engineer in provinces other than that of his residence, may so practice in the province of Ontario without holding a non-resident license or payment of fee, providing such person can on demand of the council produce credentials satisfactory to the council showing that he is a registered member of an association of engineers similarly constituted by some other province of Canada.

Membership

19. (a) Only such persons who are members of the association hereby incorporated, and registered as such under the provisions of this act, or who have received a license from the council of the association as hereafter provided, shall be entitled within the province of Ontario to take and use the title "Registered Professional Engineer," or any abbreviation thereof, or to practice as a "Professional Engineer."

(b) Each member of the association shall have a seal, the impression of which shall contain the name of the engineer and the words "Registered Professional Engineer" and "Province of Ontario," with which seal he shall stamp all official documents and plans. The design of such seal shall be approved by the council.

20. The provisions of this act shall not apply against any person while carrying on his duties in his Majesty's Naval, Military or Aerial Service.

21. In the case of engineers who were practicing in the province of Ontario, and who were accepted for overseas service in the war of 1914-1919, in the forces of Great Britain, or any of her Allies, shall on their return to Canada be entitled to all the rights and privileges conferred under section 10.

22. Notwithstanding any other provision of this act, no person shall be registered as a member of the

association until after he has attained the age of twenty-three years.

Partnership

23. (a) In the cases of two or more persons carrying on a practice as professional engineers in co-partnership, only such members who are registered or licensed under this act shall individually assume the function of a professional engineer.

(b) A firm of professional engineers cannot as such be deemed to be a member of the association or be licensed to practice.

Examinations

24. The council shall appoint annually a board of examiners for each branch of engineering from nominations made by members of council representing each of such branches.

25. (a) Examinations of candidates for registration or for license shall be held at least once per annum, at such place or places as the council may direct.

(b) The scope of the examinations and the methods of procedure shall be prescribed for each branch by the members of council representing such branch, with special reference to the applicant's ability to design and supervise engineering works which shall insure the safety of life and property.

(c) The board shall examine all degrees, diplomas, certificates and other credentials presented or given in evidence for the purpose of obtaining registration or license to practice, if referred to them by the council, and may require the holder of such degree, diploma, certificate or other credential to attest on oath, viva voce or by affidavit concerning the matter of his application.

(d) The candidate shall submit to an examination before the board or before such members of the board as may be deputed by the council, to conduct such examination, on such branch or branches of professional engineering as the candidate may elect.

(e) As soon as possible after the close of each examination the members of the board who shall have conducted such examination shall make and file with the secretary a certificate stating the result of such examinations, whereupon the council shall notify each candidate of the result of his examination and of their decision upon his application.

(f) A candidate failing on examination may after an interval of not less than nine months be examined again.

(g) The council shall from time to time prescribe the fees payable by candidates for examination, which fees shall be payable in advance by the candidates.

26. The council shall have power to establish conjointly with any council of any association similarly constituted in one or more of the provinces of Canada a central examining board, and to delegate to such central examining board all or any of the powers possessed by the said council respecting the examinations of candidates for admission to practice, provided that any examination conducted by such central examining board shall be held at least in one place within this province.

Register and Registrar

27. (a) The registrar shall issue a certificate of membership to each member admitted to the association by the council, such certificate to be signed by the president or the vice-president and by the registrar, and it shall bear the seal of the association, and shall also state the branch or branches of engineering

in which the member was examined or otherwise accepted.

(b) The registrar shall issue a license to practice to any person entitled thereto, such license to specify the work upon which the holder of the license is to be employed and the period for which the same is issued, but in no case shall the period extend beyond the end of the calendar year, in which said license was issued.

(c) The registrar shall enroll in the register provided by the council the names of all persons admitted to the association by the council, also the names of all persons licensed by council.

28. The registrar shall keep the register correct and in accordance with the provisions of this act, and the instructions of the council.

29. (a) Each member shall pay to the secretary, or such other person as may be deputed by council to receive it, on or before January 1st in each year, such annual fee for the ensuing year as may be determined by the by-laws of the association.

(b) Each person licensed by council shall pay in advance to the secretary, or such other person as may be deputed by council to receive it, such fee as the council may prescribe.

(c) The annual fee due from a member shall be deemed to be a debt due the association and may be recoverable, with the costs of same from such member in the name of the council or of the association, in any court of competent jurisdiction.

30. (a) If any member neglects or refuses to pay the annual fee for six months from the date upon which it became due after the notice from the secretary, the registrar shall cause the name of such member to be erased from the register and such person shall thereupon cease to be a member, but such person shall at any time thereafter upon payment of all fees in arrears be entitled to reinstatement as member.

(b) Any member may resign from membership in the association upon giving written notice to the secretary and by payment of all dues in arrears, if any, whereupon the name of said member shall be erased from the register and such member will be relieved of the liability for further annual dues, but such person shall at any time in the future be admitted as member upon payment of the fees prescribed by council.

(c) Any member whose name has been erased from the register shall not be entitled to any of the rights and privileges conferred by the provisions of this act until he has been readmitted as a member.

31. In case the council should refuse to register any applicant for membership in the association, or refuse to issue a license to practice to any applicant therefore, the person aggrieved shall have the right to apply to a judge of the High Court of Ontario, who upon due cause shown may make an order directing the council to register the name of such person as a member of the association, or to grant a license to practice, or make such other order as may be warranted by the facts, and the council shall forthwith comply with such order. Such order when so made shall be final.

32. The certificate of registration under the seal of the association shall be prima facie evidence of registration or license or of non-registration, as the case may be, unless the name of the member or licensee has been erased from the register.

Suspension or Expulsion

33. (a) The council may, in its discretion, reprimand or censure, or suspend, or expel any member

guilty of unprofessional conduct, or of gross negligence, or of continued breach of the by-laws of the association, or any member convicted of a serious criminal offence by a court of competent jurisdiction.

(b) The council shall not take any such action until after a complaint under oath has been filed with the secretary or the registrar, and a copy forwarded to the member accused, who shall be given an opportunity of submitting evidence in his defence, and the council shall not suspend nor expel a member without having previously summoned him to appear before the council, nor without having heard evidence under oath offered in support of the complaint and in behalf of the member accused.

(c) The council shall have the same powers as the High Court to compel witnesses to appear and give evidence under oath in the manner and under the penalties prescribed by such court and all such evidence shall be taken in writing or by a duly qualified stenographer.

(d) Any member suspended or expelled may within sixty days after the order of suspension or expulsion appeal to a judge of the High Court from such order or resolution, giving not less than seven days' notice of such appeal to the secretary of the association and may require the evidence taken before council to be filed with the proper officer of the court, whereupon the said judge shall decide the matter of appeal from the evidence so filed and shall confirm or set aside such order of suspension or expulsion, without any further right to appeal. The cost of the said appeal shall be in the discretion of the judge.

(e) Pending an appeal the member suspended or expelled by council may continue to practice. Unless the order of suspension or of expulsion be set aside, the member so suspended or expelled shall not practice thereafter, except upon the expiry of the period of suspension (in case of suspension).

Penalties

34. Any person in the province of Ontario who, not being registered as a member of the association in the province of Ontario

(a) Practices as a professional engineer;

(b) Usurps the function of a professional engineer;

(c) Uses verbally or otherwise the title of professional engineer, or makes use of any addition to or abbreviation of such title, or of any words, name or designation, that will lead to the belief that he is a professional engineer, or a member of the association, or that he is a person specially qualified to practice in any branch of professional engineering;

(d) Advertises himself as a professional engineer in any way or by any means;

(e) Acts in such manner as to lead to the belief that he is authorized to fill the offices of or to act as a professional engineer,

shall be liable upon summary conviction by any court of competent jurisdiction to a fine of not less than \$100 nor more than \$200 for the first offence, and to a fine of not less than \$200 nor more than \$500 for any subsequent offence.

35. When a person after conviction for practicing as a professional engineer continues to practice as a professional engineer without being a member of the association, or being licensed by council, the association or any official thereof may apply to a judge of

the High Court, for an injunction restraining such person from practicing or attempting to practice in the province, and the court shall, if satisfied that the person has practiced or attempted to practice as a professional engineer, grant the injunction.

36. If the registrar makes or causes to be made wilful falsification of the register, or in matters connected therewith, he shall upon conviction be liable to a fine of not less than \$100.

37. Any person who wilfully procures or attempts to procure for himself registration as member in the association by making, producing, or causing to be made or produced any fraudulent representation or declaration, either verbal or written, and any person knowingly aiding and assisting him therein, shall upon conviction be liable to a fine of not less than \$200.

38. Any and all penalties imposed under this act and any and all moneys forfeited shall be recoverable with costs under the provisions of the law respecting summary conviction and all such sums shall belong to the association.

39. No proceeding shall be commenced for any violation against the provisions of this act after one year from the date of the committal of such violation.

40. No person practicing as a professional engineer shall be entitled to recover any charges in any court of law for any service included in the practice of professional engineering as defined in this act unless he be registered as a member of the association.

Provisional Council

41. (a) The following persons are hereby constituted as a provisional council of the association:

President	of.....
Vice-president	of.....
Councillors—Representing Branch of Civil Engineers.	
A	of.....
B	of.....
C	of.....
Representing Branch of Mechanical Engineers.	
D	of.....
E	of.....
F	of.....
Representing Branch of Chemical Engineers.	
G	of.....
H	of.....
I	of.....
Representing Branch of Electrical Engineers.	
J	of.....
K	of.....
L	of.....
Representing Branch of Mining Engineers.	
M	of.....
N	of.....
O	of.....

all of whom shall hold office until their successors have been elected and appointed.

(b) If a vacancy should occur in the provisional council it should be filled by the lieutenant-governor-in-council, who should notify each member of the provisional council of such appointment.

42. (a) The provisional council shall provide the

register called for by this act, and shall cause to be entered therein the names of all persons who are entitled to registration and who apply therefor.

(b) The provisional council shall, within four months from the passing of this act, prepare provisional by-laws not inconsistent with the act for the various purposes specified in clause 4 of this act, which shall not be valid until approved by the lieutenant-governor-in-council.

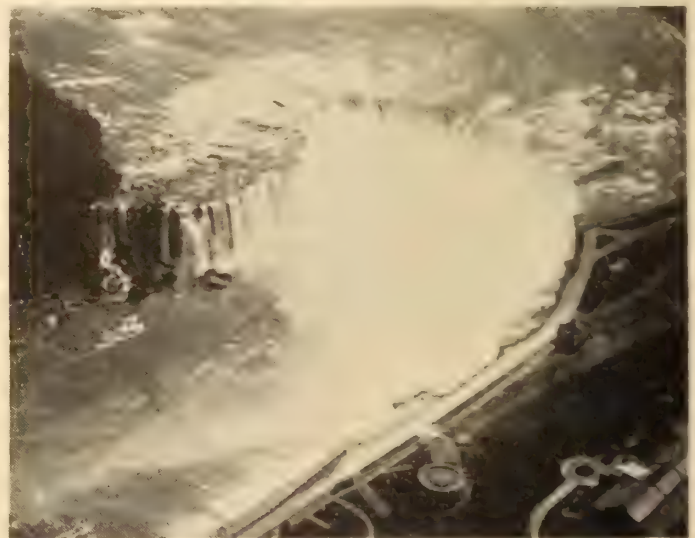
43. No provisions of this act restricting the practice of professional engineering or imposing penalties shall take effect until one year after the passing of this act.

44. Nothing in this act contained shall be construed as preventing the carrying on or construction of works by any person on his own property for the sole use of himself and his domestic establishment: nor the designing, constructing, or installing by any person of works, plants or appliances of a value not exceeding \$5,000, provided, however, that such works, plants and appliances shall not involve the safety or health of the general public.

45. Nothing in this act contained shall be construed as altering or affecting any provisions of the "Ontario Land Surveyors' Act," the "Municipal Drainage Act," the "Ditches and Watercourses Act," the "Ontario Mining Act," or the "Stationary and Hoisting Engineers' Act."

46. The activities of the association are hereby restricted to the functions necessary to the administration of this act.

47. This act shall come into force and take effect upon receiving the royal assent.



An air view of Niagara Falls showing the extent to which the "honey shoe" is being disfigured.

Captain Yves Lamontagne Joins Montreal Staff of Electrical News

Captain Yves Lamontagne, B.Sc. (McGill) AM.E.I.T., has received an appointment on the editorial staff of The Electrical News at Montreal. During the war Captain Lamontagne saw service with the Royal Engineers in England, France, and India. He hopes to revive many pleasant associations through the medium of The Electrical News.



Electric Railways

Canadian Electric Railway Ass'n

Convention of Electric Railway Men in Ottawa to Include All Canadian Systems, Both Private and Municipal—Provision Also Made for Associate Members

The dates of the Ottawa convention of the Canadian Electric Railway Association have now been definitely fixed as Monday, January 31st, and Tuesday, February 1st. As already noted in these pages, the scope of this association is being very greatly widened, and invitations this year have been sent to all municipal railway systems in Canada, as well as to manufacturers' agents and jobbing houses handling electric railway materials. Government organizations in the various provinces interested in transportation matters are also being asked for their co-operation.

The good work of the Canadian Electric Railway Association has unfortunately only been recognized by those who were privileged to be members, which, up to the present time, has included only officers of privately owned companies. The present move, therefore, is in the nature of a re-organization of the electrical railway industry, and it is hoped that officers of municipal and government owned railway systems will lend their co-operation. Canada is by no means backward in electric railway development, and our electric railway men are among the best known and most capable in the electric railway field. There seems to be no reason why Canada should not have a thoroughly well organized, efficient and effective association, and we trust that the forthcoming gathering will be instrumental in uniting the whole industry into one solid co-operative body.

For the information of those who have not been in touch with the Canadian Electric Railway Association we give below the officers at the present time. Lieut.-Col. J. E. Hutcheson, general manager Montreal Tramways Company and previous to that with the Ottawa Electric Railway Company, is honorary president. The honorary vice-president is Mr. Acton Burrows, proprietor and editor Canadian Railway and Marine World. Mr. Burrows' untiring efforts over a long period of years have been very largely responsible for the continuity and effectiveness of the Canadian Electric Railway Association. Mr. A. Gaboury, superintendent of the Montreal Tramways Company, is this year's president. Mr. G. Gordon Gale, vice-president and general manager of the Hull Electric Company, is vice-president of the association, and the office of secretary-treasurer, is temporarily in the hands of Mr. A. Eastman, vice-president and general manager of the Windsor, Essex and Lake Shore Rapid Railway Company, Mr. Eastman having kindly consented to act in this capacity in the meantime.

The executive committee is composed as follows: The president, vice-president, and F. D. Burpee, manager, Ottawa Electric Railway Co.; C. C. Curtis, manager, Capé Breton Electric Co.; A. Eastman, vice-president and general manager Windsor, Essex & Lake Shore Rapid Railway Co.; Geo. Kidd, general manager British Columbia Electric Railway Co.; M. W. Kirkwood, general manager Grand River Railway Co. and Lake Erie & Northern Railway Co.; A. W. McLimont, vice-president and general manager, Winnipeg Electric Railway Co.; R. M. Reade, superintendent Quebec Railway Light & Power Co.; Lt.-Col. G. C. Royce, general manager Toronto Suburban Railway Co.; C. L. Wilson, assistant manager Toronto & York Radial Railway Co.

Construct New Lines in Outlying District on Local Improvement Plan?

The Toronto Transportation Commission are considering the possibilities in constructing new lines in outlying districts on the local improvement plan. There are plainly many arguments in its favor though it is always difficult in



Lt.-Col. J. E. Hutcheson, Hon. Pres.



Mr. A. Gaboury, President



Mr. G. Gordon Gale, Vice-Pres.

such cases to apportion the cost equitably among the property holders in the district because it is difficult to determine the relative advantages—or disadvantages—such extensions may mean to different streets and different individuals. It not infrequently happens that a street car service along a certain street would greatly depreciate the value of the property on that particular street while greatly appreciating the values a few hundred feet away. The apportionment of cost thus becomes a matter of very fine adjustment and the exercise of excellent judgement.

It will be noted too that this "local improvement" basis of payment is the very "antithesis" of the present policy of the city of Toronto which not only has constructed out-lying railway systems out of the common fund but over a series of years has financed them on the same basis, the fare being too small to produce a revenue at all adequate for that purpose. Perhaps somewhere between the two extremes can be found a solution that is less ridiculous on the one hand and less burdensome, and less influenced by errors of judgement, on the other.

The "Silent Conductor"

Recent Invention Does Away With the Necessity of Calling Out Streets and Transfer Points—Working Well in Quebec

An interesting invention is being tried out on a number of the cars of the Quebec Railway Light, Heat and Power Co. The inventor is Mr. J. A. Everall, division superintendent of the company, and the device itself is known as the "silent conductor." Briefly described it is a device to be placed in the front end of each car which will designate to the passengers the names of the streets as they are approached along the road, thus doing away entirely with the present necessity of calling out the names, which is generally very imperfectly attended to by the conductor.

The invention promises to receive a very hearty recommendation from the railway companies and the riding public alike, because present conditions of announcing the streets are so unsatisfactory. To begin with it is noisy. Generally speaking also, the names are indistinctly announced and, finally, the practice of calling the names at all is apt to fall into disuse either because the conductor is busy or because

he feels that his patrons are so thoroughly familiar with the route that they are able to shift for themselves.

The new device automatically rolls and unrolls a display sheet upon which the names of the streets are printed. The mechanism is so arranged that it can be controlled from any point in the car, but as the conductor is usually found at the rear end it will, generally speaking, be more satisfactorily to place the control there. In the P. A. Y. E. type of car the conductor's position is definitely fixed and the location of the control must be within reach. All the conductor has to do in such a case is to pull the lever once, which brings into view the name of the street at which the next stop will be made—if desired. The passengers seeing this will give the usual signal.

Two reproductions shown herewith indicate the general appearance of the invention as installed on Mr. Everall's division of the Quebec Railway Light, Heat & Power Co. One indicates an ordinary street crossing, the other a junction point. It is evident that such a method of indicating the stops must add very materially to the smooth running of the railway system.

It is evident that the same system may be extended for use on steam roads. Here again it will be much more satisfactory than the present independent arrangement of having an official rush through the train at the last moment—if he doesn't forget. The invention is suitable for either day or night operation as it is a simple matter to illuminate the signs. The device, of course, is patented.

Canadian Cleveland Fare-box Co., Ltd.

Announcement has been made of the formation of the Canadian Cleveland Fare-box Company, Ltd., Preston, Ont. This is a development of the organization which formerly operated under the name M. C. McElligott, who now becomes president of the new company, with Mr. L. L. McElligott as vice-president and secretary. The change has been necessitated by the rapid expansion of the business, as Mr. McElligott advises us he has increased his space 400 per cent., and the staff 100 per cent., within the last four months, and that they now have the Cleveland fare-box installed on 80 per cent. of the street railway systems in Canada. We are advised that these fare-boxes are giving splendid satisfaction, and Mr. McElligott states that he considers their biggest asset is their thoroughly pleased customers.



"Silent Conductor" announcing Cremazie St.



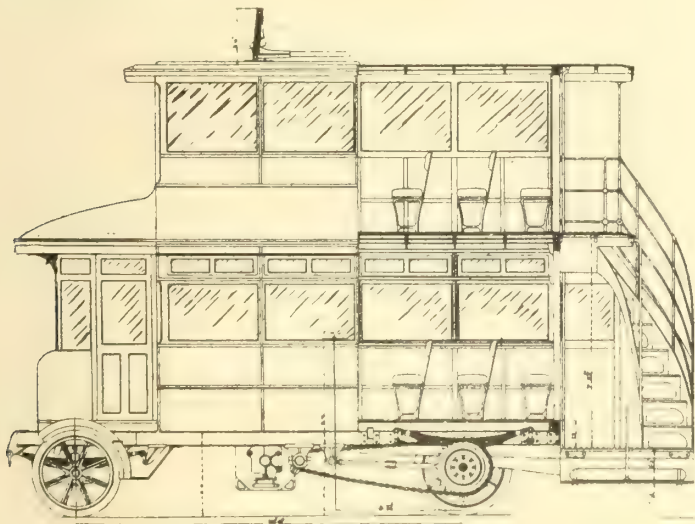
"Silent Conductor" announcing a transfer point

Three Million Railway Stock Issue

The Winnipeg Electric Railway Company is putting on the market \$3,000,000, seven per cent. cumulative preferred stock. The proceeds of the issue will be used to retire notes and bank loans. With these paid off it is expected that the company will be in a position to recommence payment of dividends on its common stock within a reasonable time. The company was recently permitted to increase its street railway fares to 7 cents cash, or four tickets for 25 cents. The company now has outstanding \$11,000,000 common stock and \$10,245,000 bonds and debenture stock, including subsidiaries. This issue is being offered at 90, and accrued dividends, yielding $7\frac{3}{4}$ per cent. and carrying a bonus of 30 per cent. in common stock.

Bradford, England, Trying Out Double-deck Trackless Trolley Cars

The Bradford, England, corporation tramways in November last placed in operation a double-deck, "trackless" electric car having accommodation for 51 passengers, 25 on the lower deck and 26 on the upper. This is the first car of this type ever placed in operation. It is driven by one 45 horse-power tramway motor, mounted on the chassis frame, connecting with the back axle by a chain. The dimensions of the car are: width, 7 ft. 10 in.; wheelbase, 13 ft.; weight, without load, five tons; rubber-tired wheels and well sprung seats are provided. A description of the car appears in the November 18th issue of the Tramway and Railway World, where it is pointed out that while intended primarily for rail-less roads this car can be run from the ordinary tramway trolley wires along the tramway track. When this is done



The Bradford Double-Deck Trackless Car

one of the two trolleys usually required for the rail-less system is lowered and fastened down and the current taken from one trolley, contact with the permanent way being effected by fixing an iron shoe to the front of the car. This shoe fits the groove of the rail and is connected by a short rod to the steering wheel of the car. It thus serves to steer the car automatically and provide the necessary contact.

The general manager of the Bradford system, R. H. Wilkinson, recently stated that in Bradford the working costs of rail-less cars were higher than they would be with properly constructed vehicles, but nevertheless were approximately four pence per mile less than those of the tramcar. With the new double-deck vehicle the working costs will probably be slightly more than those of the tramcar, but the capital cost of a rail-less line is very much less than that of the tram. Mr. Wilkinson places the cost of a double tram-

way track to-day at £40,000 per mile. He considers the rail-less vehicle more economic up to approximately a five minute service on a single line and a three minute service on a double line tramway. He states that he does not consider the new vehicle a competitor of the motor bus, as the latter is probably more economical only where a service of about an hour or longer period is required.

Mr. Wilkinson points out that in addition to the relative economy of the rail-less car they possess certain other advantages. The vehicle breaking down does not interfere with or cause any delay to other vehicles in service; they can draw close to the sidewalk for loading and unloading; they make considerably less noise and offer greater facilities for inter-running arrangements. Rail-less cars have been in regular service in Bradford since early in 1911.

B. C. E. R. Co. Figures

An interesting comparison has been made of the number of passengers carried on the street cars of Vancouver for the Christmas week of 1919 and 1920. The figures are as follows:

	1920	1919
Monday	158,288	150,101
Tuesday	157,323	181,131
Wednesday	165,276	162,669
Thursday	172,545	173,520
Friday	199,815	192,396

It will be seen that while 7,000 more people rode on the cars the last day before Christmas of 1920, there were 1,000 less on the Thursday, owing to extremely wet weather. Taken as a whole, however, the figures vary very little. In fact, the figures reveal an actual decrease of approximately 6,500 for 1920 as against 1919.

Toronto Civic Car Lines

According to figures recently reported as obtained from the Works Department of the city of Toronto the total number of passengers carried on the Toronto civic car lines for the year 1920 was 32,441,083 and the total revenue \$543,571, or an increase of almost \$100,000 over the previous year. The estimated cost of maintenance for 1920 was \$526,034, but this was made before the wage increase was granted, and it is reported will be substantially exceeded. There are also capital charges of \$207,729 to be met. It is considered probably, therefore, that there will be a deficit of about \$200,000 despite the increased business, but the exact figures have not yet been published by the Works Department. The revenue and passenger figures for the past four years are as follows:

	Revenue.	Passengers.
1917	\$278,147	16,955,540
1918	332,877	20,364,352
1919	443,575	26,622,343
1920	543,571	32,441,083

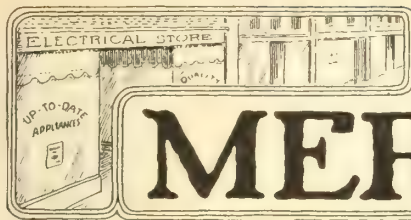
Winnipeg Earnings Increasing

The latest figures made public show that the earnings of the Winnipeg Electric Railway Company continue to increase. The net earnings for the month of November, 1920, were \$120,201, an increase of \$20,884 over the same month a year ago. For the eleven months ending November 30th, 1920, the figures are as follows:

Gross earnings	\$4,768,914	\$929,158
Operating expenses and taxes	3,553,879	520,661
Net earnings	\$1,215,035	\$408,498

The total number of passengers carried during the eleven months shows an increase of 8,000,000 over the same period in 1919.

"The superintendent or his clerk upon receiving an order for work of any kind fills out the form at the bottom in triplicate using carbon sheets, simply inserting the name, address and nature of work, the customer's order number, if



BETTER MERCHANDISING



Depression is a Myth

Electrical Dealers Say Very Little Evidence of Depression in Retail Business—No Sign of Having Reached a State of Saturation

Nothing can be obtained without cost either in labor or capital. This may seem like a trite statement, but it is a fact that we nevertheless overlook sometimes. If we would gain a certain end we must work to reach it, or if we would possess a certain object of our desire we must pay for it in money or some other form of expenditure. If we would set up in business we must first of all invest the necessary capital and give a certain amount of service to the public before we get returns. This requires faith. No man can make a success in anything without this element of faith. It is the basis of all growth and expansion, and no electrical contractor-dealer can hope to succeed without it, while, on the other hand, the man who has it need never set a limit to what he can accomplish—other things being equal.

A practical example of this truth was given during the recent holiday season by Mr. G. Wilkinson, an electrical contractor-dealer with a small but attractive store at 2958 Dundas Street West, Toronto, one of the most thickly populated districts of the city. It occurred to Mr. Wilkinson that during the few weeks leading up to Christmas and New Year there would be an unusually heavy demand in his district for electrical goods—although some other dealers were moaning about hard times, and asking when were the public going to start buying—waiting for the tide. Mr. Wilkinson decided to get after his business, but on revolving the matter in his mind he came to the conclusion that he would not be able to handle the percentage of holiday business he was entitled to if he merely confined his efforts to his own store—which was of rather limited dimensions. He consequently set to work on a plan which he believed would not only get him his share but would at the same time advertise his store. He announced a sales' contest for boys in the neighborhood under 14 years of age. He was soon swarmed with applicants, but on learning that they would be required to put up a guarantee of five dollars their enthusiasm waned. Mr. Wilkinson noticed this and immediately struck out this feature of the agreement, and picked a few of the most likely looking lads, putting them on their honor to work honestly.

"The effect was magical" says Mr. Wilkinson, "and the boys went to work with a will." The contest ran for one month. The terms of the contest were that each boy was to receive five per cent. of the total value of his sales, and a gift from the proprietor at the close of the contest. No limit was set as to the kind of goods they should sell, or, to use Mr. Wilkinson's own words—"I told them they could sell the entire stock if they got the right price for it." After four strenuous weeks the contestants reported their results. It was found that the winner, Fred. Palin, 82 Quebec Avenue had sold electrical goods to the value of \$134. On this he received a five per cent. commission and

was given a Lionel Electric train as a present. The second highest contestant sold goods to the value of \$94, and the third goods to the value of \$45. The latter two were each given a flashlight as a present, together with the five per cent. commission on their sales. The goods sold included everything from electric heaters to fuse plugs, although electric bulbs and two way sockets figured largely in the list.

Mr. Wilkinson expresses himself as very well pleased with the results, having put a nice profit in his own pocket and incidentally advertised himself more widely in his neighborhood. "The contest has been a great success," he said, "and I intend having another before long."

Mr. Wilkinson is enthusiastic about the future of electrical merchandising, and is planning to devote himself more fully to this end of the business, which he believes can be made to bring in liberal returns if concentrated upon intelligently. He has absolutely no use for the doctrine of "hard times" which he says is a myth as far as the electrical dealer is concerned.

Toronto Contractors Hold Successful Meeting and Lay Plans for "Biggest Yet" in February

The regular monthly meeting of the Toronto section of the Ontario Association of Electrical Contractors and Dealers was held in the Board of Trade rooms, Toronto, on Thursday evening, January 6th. Dinner was served at 6.30, following which the regular business of the association was transacted:

A preliminary report of the financial standing and membership of the association was read by the secretary, Mr. J. A. McKay, which was approved. The report of the Open Price Committee was read by the chairman, Mr. Kenneth A. McIntyre. The report of the Joint Examining Board, signed by Mr. Harry Rohleder, was also read by the chairman, and showed that a very high standard was being maintained with regard to the percentage necessary to be obtained by apprentices in their examinations for admission to higher grades of service and pay. The report stated that approximately seventy-five per cent. of the applicants during the past year had failed to pass the examining board.

The election of an Executive Committee of three for 1921 was next in order, and was despatched with brevity. The chairman read the names of Messrs. Drury, Roxborough and Cross who had been named at the previous meeting. It was immediately moved and seconded that the nominations be closed, and that in the absence of Mr. Roxborough, the secretary be instructed to cast a ballot, which was done, and the above-mentioned trio were duly appointed to serve for 1921. Mr. Drury and Mr. Cross both spoke briefly, urging upon the members not to sit on the fence and criticize the work of the committee, but if they had ideas to co-operate with the committee by passing these ideas along and showing how they thought things should be done. This concluded the business of the meeting and the chairman then introduced the speaker of the evening, Professor H. W. Price of the Faculty of Applied Science and Engineering,

University of Toronto, who addressed the members on the subject of "Motors, their characteristics and applications." The address was illustrated with lantern slides and diagraphs, and was listened to with close attention by the members. Professor Price treated the subject of motors in an elementary and diagrammatic way, the idea being to give his hearers a "sporting" knowledge of the characteristics and functions of the various types rather than a technical description of their construction. It must have been the feeling of every contractor-dealer who was fortunate enough to hear this lecture that there is a wide field for improvement and for education in the matter of the application of the proper motor to the various types of industrial load. The use of a wrong type or oversize motor not only means a higher initial cost to the consumer, but a constant source of worry and expense to both the consumer and central station. A very hearty vote of thanks was given to the speaker and the hope expressed that the association would again have him as its guest at no very far distant date.

The contractors' association in Toronto may now be considered as having completed its organization period and got down to "work." The type of "entertainment" now being provided at these monthly meetings must soon result in a very distinct improvement in the standard of both the viewpoint and the performance of the members.

The next meeting will be addressed by Mr. W. H. Morton, general manager of the National Association of Electrical Contractors and Dealers, New York. For this meeting fifty tickets were sold in advance, so that a record attendance is indicated.

Suggestions for February Window Displays— Some of Us Don't Look Far Enough Ahead

Most of us don't look ahead far enough. Often our noses are held so close to the grindstone attending to the demands of to-day that it seems quite impossible to give any thought to-morrow. While this condition is bad in any business it is particularly so with the electrical dealer, whose main source of success often lies in taking advantage of special opportunities to reach the public with his message. The best instance of this is the special effort all retailers make at Christmas time, but the experienced retailer is not satisfied to let other, if smaller, anniversaries or special occasions go by without capitalizing them.

For this reason it is wise to plan well ahead and lay out a schedule for window displays and store campaigns and demonstrations some weeks ahead. For example:

The month of February offers splendid opportunities to the Contractor-Dealer for the use of telling sales' ideas and window displays. It is a dark, cold month, as a rule, when people want plenty of artificial light and heat, and the electrical store is the logical place for them to seek their requirements.

There are one or two special days in February which the window trimmer will do well to feature in his displays. The first is Ground Hog Day, which comes on Feb. 2. A great many people are unable to recollect such dates as these, and yet they are quite interested in the myth about the ground hog coming out to look for his shadow. Some people use a bear instead of a ground hog in telling the story. The electrical dealer will do well to have a couple of window cards, and perhaps a background, ready for the occasion. Here are a couple of window card suggestions: "The Ground Hog saw his shadow to-day and has retired for another six weeks. This comes of not having a proper electric lighting installation which practically eliminates shadows. How is it in your home?" Or another something like this: "Weather Forecasts—By Professor Ground Hog—Six more

weeks hard weather. Be prepared with a B— heater. It will keep your rooms cosy." In the background, the dealer might incorporate a representation of a ground hog, just emerging from his hole, and finding suspended above his head a lighting unit which illuminates his surroundings so thoroughly that he can't find his shadow. A card might accompany it, something like this: "Our fixtures will light your home so thoroughly that you can't find a shadow."

St. Valentine's Day comes on Feb. 14, when cupids, hearts and arrows, will be in order in your window display. The electrical dealer can take advantage of the occasion by featuring, "Illumination for the Valentine Party—Lamps that will make your drawing room more attractive." Colored lamps and silk shades could be shown to advantage, as particularly suitable for decorative purposes. "Gifts for Your Valentine" might also be featured, using dainty boudoir lamps, percolators, etc. "If you want to make YOUR arrow effective attach an electrical gift to it."

It should be remembered that in February the "Social" season reaches its height, and that anything that has decorative value for the drawing room or the banquet table can be most opportunely used in displays. Standard lamps and lighting novelties will perhaps be particularly applicable for this purpose.

It is wise, also, as pointed out above, to co-operate with the elements in your window displays. February is generally a rather cold month—some would say that was putting it mildly—and many who will be finding difficulty in forcing sufficient heat out of their furnaces may be tempted to buy electric heaters.

As a final suggestion for February, we might say, keep your sidewalks clean and navigable, if the municipality does not do it for you. Don't have a mess of snow broth in front of your store, through which a customer will have to wade, up to her ankles, and don't have a sheet of ice on which she may unexpectedly sit down.

Electrical Section Canadian Manufacturers' Association, Montreal

An electrical manufacturers' section of the Montreal branch of the Canadian Manufacturers' Association was formed on January 5, at a meeting in Montreal. The section is to consist of members engaged in the manufacture of electrical apparatus and equipment, at present members of the association, and such other manufacturers of electrical apparatus and equipment as, in the future, may become members of the association.

Mr. M. K. Pike, sales manager of the Northern Electric Company, was elected chairman of the section, and Mr. R. Moncel, of the Devoe Electric Switch Company, vice-chairman.

The idea of the section is to afford means by which the members can be brought into closer relation for the discussion of such matters as tariffs. Mr. J. McIntosh, manager of the trades section of the Manufacturers' Association, Toronto, explained that he was in Montreal, at the suggestion of the Montreal Executive Committee, for the purpose of assisting in the organization into permanent sections of the various groups which had been brought together for the purpose of formulating their views for presentation to the Ministerial Tariff Commission. He indicated the facilities provided in the by-laws of the association, as a result of which a secretarial service was supplied to members who desired to get together on questions of common interest respecting any particular trade.

Mr. J. Mochon, secretary and manager of the Electrical Co-operative Association of the province of Quebec, was present at the meeting.

Getting Closer Together in Quebec

At a meeting of the Electrical Contractor-Dealer Association of the Province of Quebec (English Section, Montreal) held on January 3rd at the office of the Electrical Co-operative Association of the Province of Quebec, negotiations with the Jobbers' Association were discussed. Committees of Contractor-Dealers and of the Jobbers' Association have held meetings with a view to adjusting certain questions relating to the sale of electrical appliances, but without any definite understanding being reached. It was decided at the meeting to communicate again with the Jobbers' Association. During the discussion it was stated that there was a tendency for the jobbers to eliminate sales to the public, although instances were given where jobbers had given substantial discounts to the public. It was further stated that the Co-operative Association have under consideration, the drawing up of a code defining the trade meaning of each section of the electrical industry, such as manufacturer, contractor-dealer, jobber, etc.

Montreal Electrical Club

Mr. J. J. Yorke, of the St. Lawrence Sugar Refineries, Limited, gave an interesting talk on the manufacture of sugar before the members of the Montreal Electrical Club at the regular weekly luncheon on January 5th. In introducing the speaker, Mr. W. B. Shaw, the chairman, stated that Mr. Yorke was no stranger to the electrical industry. He was associated with the old Royal Electric Company, Montreal, many years ago. During his remarks, Mr. Yorke referred to some of the work he had carried out when he was with the Royal Electric Co. He had made the first Edison incandescent installation in Montreal. Mr. Yorke then went on to explain the different processes necessary in the refining of sugar.

The only out-of-town member present at the luncheon was Mr. Longtin of the L. & N. Co., St. Johns, P.Q.

Mr. J. M. Mochon, Secretary-Treasurer of the Electrical Co-operative Association of the Province of Quebec, stated that several matters of importance would be brought up for discussion at the next luncheon.

A Pair of Wires and a Dial

A very interesting booklet—and very attractively made up too—is being distributed by the Northern Electric Company. It is entitled "A Pair of Wires and a Dial," and is designed to demonstrate the variety of uses to which a private automatic exchange may be put, and the tremendous volume of savings in time and money that may be affected. At the back of the book is an information sheet for the use of anyone interested in learning more about an automatic interior telephone system. The booklet is attractively illustrated. The automatic system described in this booklet is known as the P.A.X. This system consists of as many automatic telephones as are required, each one equipped with a dial by which all the various services are controlled and operated. The central mechanism is supplied in two sizes, the 25 telephone and the 100 telephone. For larger installations the system is built up by adding 100 type boards together just as sectional filing cabinets are built up. There need be no limit as to size.

The report of the Administrative Chairman of the Honorary Advisory Council for Scientific and Industrial Research in Canada, for the year ending March 31, 1920, is just to hand.

Welding Accessories Corporation

Further information is to hand regarding the Welding Accessories Corporation, 501 West 44th Street, New York, regarding which our recent personal item noted that Mr. A. H. Dion, for many years with the Moose Jaw Electric Railway Company, had resigned to become managing director. This company is being enlarged by the introduction of English and Canadian capital. The principal business is the manufacture of alternating current welding machines and bare and covered electrodes. The covered electrodes are protected by a secret process and, according to Mr. Dion, enjoy the reputation of being the best on the market. Mr. C. B. Waters is the inventor of the process and will act as consulting engineer.

Church Hymns by Wireless

Church hymns by wireless telephone became a reality last Sunday night, January 2, when the musical service at the Calvary Church on Shady Avenue, Pittsburgh, Pa., was sent out via the experimental radio station of the Westinghouse Electric & Manufacturing Company at East Pittsburgh. A private telephone line was installed between the church and East Pittsburgh, and the music collected in transmitters at the Calvary Church and transmitted over this line. It was then amplified and sent out over the radio telephone, making it possible for persons, having wireless receiving sets, within several hundred miles of Pittsburgh, to hear the hymns. The choir music consisted of forty-five voices, a boy choir which, with the organ, blended to make inspiring music. Anthem and offertory carols were the features of the programme. In previous experiments with other kinds of music, such as orchestral and dance, wireless amateurs, at distances as great as 1,000 miles, have been able to hear very clearly the music as given from the Westinghouse experimental wireless station at East Pittsburgh, and it is not unlikely that this music was heard by them.

Better Packaging of Fixtures

Kitchener, Ont.

Editor, Electrical News:

Considerable progress has been made by fixture manufacturers in the United States in the packaging of fixtures, and we believe that this point should be put very forcibly to the fixture manufacturers of Canada, who are not making the progress that they should in regard to standard packaging of their fixtures. We feel that fixtures packaged in cartons, manufacturer's name, number and finish, and if possible a cut on outside of carton, would save the contractor a substantial amount every year, as every contractor, without doubt, experiences great loss from the spoilage and damage due to the present way the fixtures are packed.

Anything that you could do to call attention to this matter would be appreciated very much.

Yours very truly,

Ellis & Howard, Ltd.,

Obituary

The death occurred recently of Mr. James Bryce, formerly vice-president and general manager of the Canadian Express Company, Montreal. Mr. Bryce was born in Galt, Ont., in 1846, and was one of the first operators in the Great Northwestern Telegraph Company. In 1882 he was appointed manager of the Intercolonial Express Company at St. John, N.B., and held that post until 1889 when he was appointed manager of the Canadian Express Company at Montreal. In 1896 he was appointed vice-president and retired in 1911.

Quebec City Electrical Dealers Know the Value of Good Window Displays

Quebec Electric Co.

Quebec Electric Company, Quebec, contractor-dealers, have one of the most up-to-date stores in that city. They carry all kinds of electrical appliances, together with fixtures and lamps. This store was first opened 16 years ago, and still occupies the same site on St. John Street. The left side



Mr. H. Jobin, 22 years' experience in electrical contracting.

of the store is set apart for electrical heating appliances. Fixtures of varied makes and design are suspended from the ceiling, while table lamps are tastefully arranged on a table at the back of the store. The office is also situated at the back of the store, while behind this is the stock room and

repair department. Mr. R. Doddridge is the general manager.

O. Picard & Fils

O. Picard & Fils, is another of Quebec's most important contractor-dealer firms. All makes of appliances are kept together with a small stock of fixtures. Upon entering the store, an attractive showcase on the left immediately catches the customer's eye. Percolators, toasters, electric irons and other appliances are neatly arranged in the showcase. Mr. Picard's idea in the arrangement of the store is to show only a few articles, but have them arranged to the best advantage. Cabinets containing lamps, etc., occupy both sides of the store, while spare parts for appliances are kept in a cabinet in the rear. Mr. Picard's office is situated at the back of the store.

H. Jobin, of Jobin and Paquette

Mr. H. Jobin, of Jobin & Paquette, electrical contractors, has had 22 years experience in the electrical contracting business. Mr. Jobin was formerly with the Mechanics Supply Company, Quebec, leaving this firm to go into business with Mr. Paquette. In 1918 Mr. Paquette died and Mr. Jobin continued the business under the name

Brousseau & Frere

The firm of Brousseau & Frere, electrical dealers, Quebec, was established in 1902, by Mr. J. E. Brousseau and Mr. I. G. Brousseau. This firm at first only occupied a small space, but with the addition of plumbing and hardware departments they now control a whole block. They specialize in electrical fixtures, but have for sale a variety of other electrical appliances.

A complete electric plant will be purchased in the early spring by St. Peter's Catholic College, Muenster, for installation in new \$150,000 college under construction.

Interior of O. Picard & Fils' retail store. This firm is one of the most flourishing in the city. Some good ideas in arrangement.



Two More Quebec City Stores



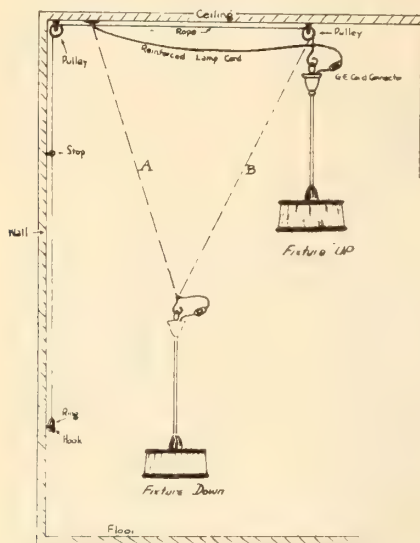
Window display of Brosseau and Frere, in business since 1902. Business grown from small beginning to one of large proportions

One of Quebec City's best electrical stores. Its success is largely due to the efficient general manager, Mr. R. Doddridge. Have been in business sixteen years and developing all the time.



Simple Method of Exhibiting Fixtures

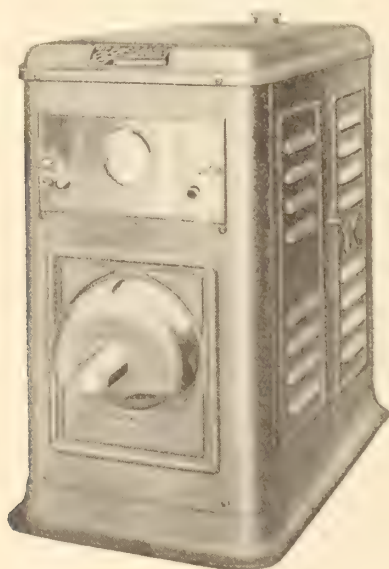
The diagram shown here illustrates a simple and convenient way of exhibiting an individual lighting fixture to the best advantage. The fixture is attached to a rope running on two pulleys fixed to the ceiling. At the near end of the rope is a ring which attaches to hooks placed at intervals on the wall. In this way the fixture can be hung at various distances from the ceiling. When the lamp is down



the reinforced lamp cord connected from the ceiling outlet to the fixture assumes the position shown in the diagram as A, while the pulley cord assumes the position of B. This simple apparatus can be used either in the window or store, but is intended principally for the individual display box. It allows the fixture to be seen at close range without straining one's anatomy and at the same time shows off the fixture as it will look when hung from the ceiling of the home.

A Very Compact Lighting Plant

The Canadian Linderman Company, Ltd., are now placing their 1,000 watt power and lighting plant "Electrion" on the market. This is a self-contained 3 volt, electric generat-

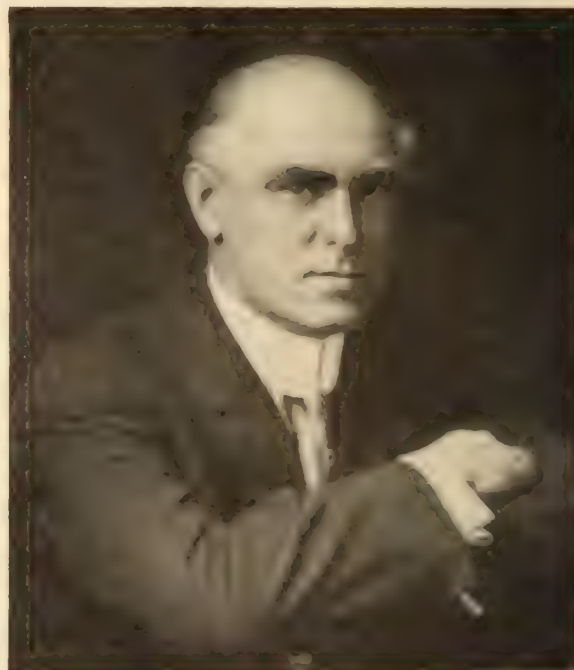


ing unit, battery type, which has a number of special features. It is semi-automatic or full automatic as required, and as the reproduction indicates, is enclosed in a metallic case which is

dust proof and practically weather-proof. A feature that the Linderman company considers exceedingly valuable is what they call the "control case." This includes all the vital electric apparatus in the plant, combined in one removable unit. This complete unit slides in and out like a table drawer, and should there be any failure in the operation of the plant it is almost certain to be in this control case. On account of the ease with which this case can be removed it is taken out and replaced by another, which the dealer carries in stock, while the injured case is being repaired. The generator is of the compound wound type; the bearings are S. K. F. double row, self-aligning; the magneto is the Dixie, and the splash system of oiling is used. The motor is $2\frac{1}{2}$ horsepower actual rating. Another attractive feature of this plant is a specially made cabinet which not only keeps the battery clean, but is itself an attractive piece of furniture. The same company manufacture a 110 volt full automatic 1000 watt capacity machine. The dimensions of the electric case are as follows: height 20 inches, width 16 inches, length 18 inches; weight, 450 lbs., or when crated 520 lbs. These figures apply to all types.

Business Change

The announcement has just been made that Mr. George C. Rough has disposed of his interest in and resigned from the Packard Electric Company, St. Catharines, Ontario, of which he has recently been president and general manager. It is his intention to continue in the electrical business and locate in Montreal as manufacturers' representative. He



Mr. George Rough

will shortly leave for England to complete arrangements for several important lines to be placed on the Canadian market.

Few men are more widely known in electrical circles than "George" Rough. For a quarter of a century he has been selling "Packard" apparatus, originally in conjunction with Mr. R. E. T. Pringle and five years later joining its sales organization as sales manager. About three years ago he became president of the company. His experience and connection will enable him to give most effective service to manufacturers.

An Article Well Displayed Is Half Sold

"An article well displayed is half sold," was the crypt statement made by Mr. A. F. Winegarden, proprietor of "The People's Electric Co., 656 Dundas St. E., London, Ont., during an interview recently, and judging by his window display this enterprising contractor-dealer is trying to live up to this slogan.

Mr. Winegarden commenced business about ten years ago in a store on the other side of the street, but moved to the present location about four and a half years ago. "If I had moved into this store at the first I would have been thousands of dollars in pocket," was his remark. "Location counts for a great deal in the electrical business."

Five years ago this dealer entered into partnership with another gentleman but bought him out about a year ago. The business has been growing steadily from its inception and shows every prospect of continuing to do so.

The accompanying photograph shows the special window display of "People's Electric" for Christmas. The floor of the window is covered with an ordinary house rug of light and dark shades of brown with just a touch of green. On the right of the window is a library table with a linen shade table runner laid along the top. Standing on the table is a portable lamp, the whole offering a splendid suggestion for lighting the library or living room. On the left is a brick fireplace with reflecting heater showing its comfortable glow to the prospective shopper gazing in at the window, and directing its heat to the enquirer inside the store. Toasters and irons are displayed on the mantle shelf, along with two small portable lamps. Next to the fireplace and nearer the window front is placed a bronze statue on a small stand. In the uplifted hand of the figure glows a small electric light.

The back of the window is decorated with a Christmas tree on which is hung several articles such as irons, toasters, etc., suggesting suitable gifts for the festive season. To the right of this is a washing machine. Samples of grills, toasters, lamps and vacuum cleaners are arranged on the floor of the window, the whole making a very attractive display.



An effective window display put on by the People's Electric Co., 656 Dundas St. E., London, Ont., for the Christmas season. Mr. Winegarden, the proprietor, a firm believer in advertising.

Contracting has always received special attention from Mr. Winegarden and he has installed the electrical equipment in some of the public buildings of his city.

A large feature of this business is the sale of electric labor saving devices. Washers, vacuum cleaners, air heaters and smaller devices for which there is a large demand.

Regarding the value of advertising, apart from window displays, Mr. Winegarden expressed his opinion that a small monthly calendar had been of the most value to him in bringing definite trade. He worked up a mailing list from the telephone directory and was satisfied that no other advertising could compare in net results. The newspaper method of making his goods known was of value only when announcing special sales with special prices, although he always has his name in the directory of one of the local newspapers. "Mailing cards is good business," he said, "because they go direct to the people a dealer wants to do business with."

"From my experience I find that a great number of people canvas the city for the cheapest store, or the most attractive, so that in the end the window display is one of the most valuable means of advertising," was another statement of this dealer.

Overhead are several indirect ceiling fixtures placed there for the double purpose of display and window light. The chief fault of many window displays has been avoided, that of overcrowding. Without doubt this window attracted customers to the store.

The Diamond State Fibre Co of Canada

The Diamond State Fibre Company are now handling Diamond F protective papers and are carrying a stock of these at their Canadian branch 455 King West, Toronto. Mr. Webster also states that they are in a position to manufacture special fibre shapes such as pulleys, noiseless gears, bushings, washers, etc., at the King Street plant.

The Ward Leonard Electric Company have just published an interesting illustrated folder outlining the principles and giving general information regarding the vitrohmi (vitreous enamelled) field rheostats of various types which they manufacture. The folder is full of interesting detail, arranged in a classified and orderly manner. The company will furnish specific information on request.



A very attractive window display made by the Toronto Electric Contracting Company, Toronto, for Christmas trade. Mr. Green, the manager, believes in having his windows on his sales.

A Handsome Christmas Window

The window shown here is that of the Toronto Electric Contracting Company, 452 Bloor West. Mr. A. D. Green, the proprietor, is a firm believer in the value of window-space, and each Christmas finds him with a seasonable and suggestive window display. The background shown here was built up with considerable labor, and was very effective at night when all the lights were on. In the foreground of the scene is a roadway bridge and behind, and a little higher up, a railway bridge. By means of belts connected to a series of gears operating on an electric motor at the back of the window, a sleigh holding Santa Claus and his presents, drawn by reindeer, and a miniature electric train were made to pass over their respective bridges at the same time. Children were constantly in evidence around the window, and this was the means of drawing the older folk too. The foreground of the window was given over to an attractive display of electrical appliances. There is only one feature about this window display that might be open to criticism and that is with regard to the name of the company and the too prominent a place it holds on the window. The name, Toronto Electric Contracting Company emphasizes, we think too much the contracting end and not enough the merchandising. And secondly, the name being so prominently displayed detracts from the effect of the window display. It would be much better in small type down the side of the window, or on the doorway. Apart from these objections the display is a very good one and worthily represents the high standard of merchandising set by the electrical industry. Mr. Green is a reasonable optimist, and sees no cause for alarm in present conditions. He reports a very successful season, and is quite confident that 1921 will be a bigger and better year for the electrical contractor-dealer.

By practically a unanimous vote the electors of Toronto on New Year's day voted to ratify the agreement of purchase of the assets of the Toronto Electric Light Company and certain sections of the Toronto & York Radial Railway Company, as outlined in our recent issue.

The total earnings of the Toronto Street Railway for December, 1920, amounted to \$706,788.73. This is made up as follows: tickets, \$612,510; police, \$1,166.66; post office, \$4,725.42; and cash, \$88,386.65.

President Manitoba Electrical Association

Mr. Fred J. Pratt is the energetic president of the Manitoba Electrical Association. Mr. Pratt has held this important position since July, 1920, and during the past six months has been mainly instrumental in increasing the membership fifty per cent. Mr. Pratt is the purchasing agent for the Winnipeg Electric Railway Company and is always keen to advance any interests dealing with phases of the electrical



Mr. Fred J. Pratt

industry. He is a native of Cobourg, Ontario, and entered the employ of the Winnipeg Electric Railway in 1902 as clerk in the head office. By conscientious effort he has worked himself up to his present position. Apart from his official duties, Mr. Pratt takes a live interest in numerous organizations, and is held in very high esteem among the amateur sporting fraternity of Winnipeg.

The Ward Leonard Electric Company are distributing an interesting folder describing their current regulator rheostat for 20 ampere motion picture lamp used on 32 volt current. This folder is designated circular No. 502.

A Most Energetic Secretary

Mr. J. H. Forward is secretary-treasurer of the Manitoba Electrical Association. A successful association must have a really live wire as its secretary—and the Manitoba Electrical Association is fortunate in having a gentleman filling this position who is very much interested in all that pertains to creating a strong organization. Born in Cherterville, Ont., he completed his education in that province



J. H. Forward, Secy.-Treas., Manitoba Electrical Association

and in 1908 he acted on the advice of Horace Greely and came west. He started his business career with the Shipman Electrical Company and spent eight years with that firm in the capacity of salesman, leaving then to take a position on the staff of the Public Utilities Commissioner, which he held for four years. At the present time Mr. Forward is electrical superintendent in the Public Works Department of the Manitoba Provincial Government. When he is not busy doing anything else, Mr. Forward expands his energy in bowling, gardening, chicken and bee-raising.

Successful Annual Convention

The International Business Machines Company held their annual convention of Canadian salesmen at the offices of the company, Royce & Campbell Avenues, Toronto, during the week of January 3rd. Figures presented at the convention show that the Canadian organization held all sales records for 1920. In fact it was shown that the Canadian organization had led the entire world in sales on percentage of quota for four consecutive years, the quotas being based on the same figures, namely, population. A very enjoyable and profitable entertainment was provided for the delegates, including an address by Mr. Thos. J. Watson, the president of the Computing Hykon Recording Company of New York; Joe E. Rogers, general manager Tabulating Machine Company, New York; S. M. Hastings, president of the Computing Scale Company of America, Chicago, and Mr. S. Spahr, general manager of the Computing Scale Company of America, Dayton, as well as D. C. Wells, general manager of the Moncyweight Scale Company, Chicago. A theatre party, dance and banquet at the King Edward were among the auxiliary entertainments.

The Universal Utilities Corporation, Alpena, Michigan, has issued an interesting illustrated folder describing their portable Universal electric clothes washer.

Current Notes

The Canada Electric Co., 175 King East, Toronto, has been awarded the contract for electrical work on \$150,000 theatre under construction for the Paramount Peterboro Theatres, Ltd.

Messrs. R. S. Muir & Co., 32 Park Avenue, Montreal, have been awarded the contract for electrical work on four residences being erected on Regent Avenue at an approximate cost of \$10,000 each.

Messrs. Richardson & Cross, 79 King Street East, Toronto, have been awarded the contract for electrical work on \$60,000 church and Sunday school being erected at Indian Grove and Glenlake.

The Toronto Electric Co., 101 Duke Street, Toronto, have been awarded the contract for electrical work on \$60,000 factory being erected at King and Sackville Streets for the Decalcomania Company of Canada, Ltd.

The new schedule of fares for the St. John Street Railway Company has gone into effect. The new tariff calls for a ten-cent cash fare, book of three for 25 cents and 15 for one dollar. The old single rate fare was six cents.

Telegraph operators on the Grand Trunk and Canadian National Railways have been given an increase in pay. It dates from December last and will come with the January pay envelope. The new scale will average an increase of about \$30 a month over the old rate. This increase applies to railway operators only. It is expected that next spring an arrangement will be effected to put both commercial and railway operators on the same basis.

We have all you require for that Electrical Job

Send us your Order and convince yourself

These are a few of the manufacturers for whom we are the Distributors:—

Crouse-Hindes of Canada.
Harvey Hubbell Co.
Benjamin Electric Co.
Duncan Electric Co., Ltd.
Canadian National Carbon Co.
Steel City Electric Co.
Square D. Company.
Conduits Ltd.
Renfrew Electric Co.
Canada Wire & Cable.
Standard Underground Cable Co. of Canada.
National Conduit Co., Ltd.

Canadian Electrical Supply Co. Ltd.
165 Craig Street West - Montreal, Que.

Quebec Branch : 28 St. Joseph Street, Quebec, Que.

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

WANTED—D. C. 220 volt motors, any horsepower up to 25

THE KAUFMAN RUBBER CO., LIMITED,
23-2 Kitchener, Ont.

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1.
Walter Clinton, Welland, Ont. 22-3

For Sale

3—300 H.P. Westinghouse-Canadian Synchronous Motors; 3 Phase, 60 Cycle, 2200 Volts, 580/600 RPM.; equipped with Direct Connected Exciters; 2 Bearings, with extended shaft for coupling.
ARTHUR S. PARTRIDGE,
1-2 415 Pine St., St. Louis.

Motors for Sale

Large stock of 25 cycle and 60 cycle Motors, consisting of Westinghouse, Crocker-Wheeler and C. G. E. makes. Motors purchased from American Government and have seen little or no use. Attractive prices.

Apply—L. S. Tarshis & Sons,
400 Front St. East,
2-5 Toronto, Ont.

German Competition in the Electrical Trades

Every day brings evidence of the fact that Germany is making another bid for the manufacturing trade of this country.

The Board of Trade returns recently published show that: (1) The imports of manufactured and partly manufactured goods from Germany for nine months in 1913 amounted to 41 million pounds. (2) The imports from the same source, for the same period of the present year (1920) totalled 17 million pounds.

Before the war Germany by her policy of "peaceful penetration" had managed to secure something like 80 per cent. or 90 per cent. of the British trade in electrical accessories. This had been accomplished by dumping immense quantities of these goods at prices which made the production of such articles unprofitable to British manufacturers. This naturally had the anticipated and hoped-for result of discouraging or freezing-out would-be makers, leaving a few old-established firms to share amongst them the small balance of business obtainable from those (unfortunately now so few) who had a preference for good-class British-made goods. Then came the war!

When the war started the Government of this country soon found that British makers of electrical accessories were quite unable to furnish sufficient of these articles to meet urgent war requirements. British makers were immediately urged to "get a move on," and other firms decided to take up the manufacture, helped no doubt to that decision by the Government promise of protection after the war. The whole country seemed to be fully alive to the fact that our pre-war policy

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

ELECTRICAL ENGINEER, college graduate, ten years' experience lighting, power maintenance and electrolytic gas making, would like position as assistant engineer or to take charge of small plant. Best references. Box 450, Electrical News, Toronto. 2-3

WESTERN CANADA—Man with extended experience in electric fixtures, supplies, heating goods, etc., and good connection in Western Canada, would like to represent reliable firm in one of these lines or a specialty. Western Canadian territory preferred. Box 701, Moose Jaw, Sask. 2

Manufacturers' Agents in Vancouver, B. C.

desires Agency Propositions on Electrical Specialties of proven merit. References on request. Box 66, Electrical News, 212 Winch Bldg., Vancouver, B. C. 2-3

of allowing Germany to get the trade into her hands was wrong. Never more! said the Government, must this thing happen! After the war we will bring in a Bill to prevent it. Never more! echoed the Press. One comic paper (very comic it appears now) published a cartoon of "the bravest man in this world," depicting a German traveller about to land on these shores.

And now, in this year of grace and peace, how do we stand? The Bill that was to prevent the British manufacturer from losing his trade to Germany has been postponed to next season, but the Government is still (two years after the war) "giving the matter anxious consideration."

We have recently received from correspondents particulars of electricity meters offered by a Swedish firm, of German manufacture, and motors and generators offered by a company with an English name but foreign directorate, domiciled in London, these machines also being of German make, the prices in both cases being extremely low; doubtless there are many other channels by which German products reach this country.—Electrical Review.

Lamp Voltage Standardization

Standardization of operating voltages of central stations again is being urged by the N.E.L.A. Lamp Committee. Mr. Frank W. Smith, Chairman, as a result of present conditions. During the last few years standardization has been approximated by reason of the introduc-

tion and perfection of the ductile tungsten filament.

The Committee points out that manufacturers at present are producing lamps at sixteen different voltages, ranging from 104 to 130 volts, in addition to special-voltage lamps produced by request when ordered in quantity. The Committee calls attention to the fact that at present practically all devices operated by motor will function satisfactorily at voltages ranging between 105 to 125, and that heating devices in common use are generally made for two voltage ranges, 105-115 and 115-125.

It is pointed out by the Committee that under existing circumstances it now is feasible for practically all member companies, where necessary, to readjust their operating voltage, thus doing away with the use of odd-voltage lamps and maintaining an average voltage so that either 110, 115 or 120 volt lamps can be used.

This is in line with the present general movement for standardization in the electric light and power industry, as a means of giving better, more efficient, more economical service to the public and with that idea in view, standardization should be accomplished wherever and whenever feasible.

Something Unusual

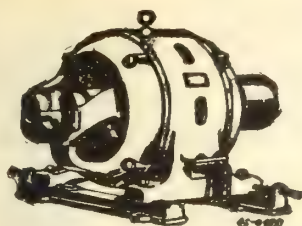
If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-16

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	60	3	25	550	750	C. & W.
New	2	52	3	25	550	725	Lanc.
Used	1	50	3	60	550	900	C. & E.
"	1	50	3	60	550	950	Westg.
"	1	50	3	25	550	720	Westg.
New	1	35	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	Tor. & Hm.
"	1	25	3	60	220	720	C. & W.
"	1	15	3	25	550	1450	Westg.
New	1	15	3	25	550	1400	Lanc.
"	1	15	3	25	550	750	Lanc.
"	6	15	3	25	550	720	Westg.
Used	1	11	3	25	550	725	C. & W.
New	2	10	3	25	550	720	Westg.
Used	1	7 1/2	3	25	220	1500	Tor. & Hm.
"	1	7 1/2	3	25	550	1400	C. & E.
"	1	7 1/2	3	25	550	700	Lanc.
New	3	7 1/2	3	25	550	725	Westg.
"	1	5	3	25	550	1400	Excelsior
"	1	5	3	25	550	710	Wagner
New	1	5	3	60	250	1150	Westg.
Used	1	5	3	60	110	1750	Excelsior
New	3	3	3	25	550	1500	Lanc.
"	5	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
"	2	2	3	25	550	1400	Excelsior
"	2	2	3	25	550	1425	Lanc.
New	3	2	3	25	550	1500	Lanc.
"	1	2	1	25	110	1400	Wag.
"	1	1 1/2	1	25	110	1425	Wagner
New	1	1	1	25	110	1400	Wag.
Used	1	1	3	25	220	1500	Tor. & Hm.
New	2	1	1	25	110	1400	Wagner
New	1	1	3	25	550	1425	Lanc.

Write for Prices

H. W. PETRIE, Limited
131 Front St. West - Toronto Ont



Machines *In Our Montreal Stock*

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new "Kuhlman" Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately three to four weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.
1—300 H.P. 300 RPM. Slip Ring
2—300 H.P. 490 RPM.
1—100 H.P. 600 RPM.
1—75 H.P. 1200 RPM

3 Phase 60 Cycle 550 Volt.
2—200 H.P. 600 RPM. Slip Ring.
1—100 H.P. 600 RPM. Slip Ring.
2—75 H.P. 900 RPM.
1—50 H.P. 900 RPM. Slip Ring.
4—50 H.P. 900 RPM.
3—50 H.P. 1200 RPM.
2—30 H.P. 1200 RPM.
4—35 H.P. 1200 RPM.
1—35 H.P. 1800 RPM.
4—35 H.P. 900 RPM.
3—30 H.P. 1200 RPM.
1—25 H.P. 900 RPM.
2—25 H.P. 1200 RPM.
1—20 H.P. 900 RPM.
2—15 H.P. 900 RPM.
1—10 H.P. 1800 RPM.
2—10 H.P. 1200 RPM.
3—10 H.P. 720 RPM.
1—8 H.P. 810 RPM. Crane
2—7½ H.P. 900 RPM.
7—7½ H.P. 1200 RPM.
2—7½ H.P. 1800 RPM.
3—5 H.P. 900 RPM.
14—5 H.P. 1800 RPM.
1—4 H.P. 1140 RPM. Crane
22—3 H.P. 1800 RPM.

12—3 H.P. 1200 RPM.
15—2 H.P. 1800 RPM.
14—2 H.P. 1200 RPM.
Single Phase 30 Cycle 110/220 Volt
1—1/8 H.P. 1415 RPM.
1—1/6 H.P. 1425 RPM.
2—1/6 H.P. 1750 RPM.
1—1/2 H.P. 1420 RPM.

3 Phase 60 Cycle 440 Volt
2—50 H.P. 900 RPM.
8—30 H.P. 900 RPM.
2—30 H.P. 850 RPM.

3 Phase 60 Cycle 220 Volt.
1—75 H.P. 900 RPM.
1—60 H.P. 900 RPM.
2—50 H.P. 900 RPM.
2—40 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—20 H.P. 1200 RPM.
1—15 H.P. 1200 RPM.
1—15 H.P. 1150 RPM. Slip Ring
3—10 H.P. 1800 RPM.
2—7½ H.P. 1750 RPM.
3—7½ H.P. 1200 RPM.
2—5 H.P. 900 RPM.
5—4 H.P. 1200 RPM.
2—3 H.P. 1200 RPM.
1—3 H.P. 1800 RPM.

Single Phase 60 Cycle 110 Volt.
2—7½ H.P. 1800 RPM.
3—3 H.P. 1800 RPM.

10—3 H.P. 1800 RPM.
1—3 H.P. 1165 RPM.
1—2½ H.P. 1800 RPM.
11—2 H.P. 1800 RPM.
5—1 H.P. 1800 RPM.
5—3/4 H.P. 1800 RPM.
23—1/2 H.P. 1800 RPM.
14—1/3 H.P. 1800 RPM.
45—1/4 H.P. 1800 RPM.
16—1/6 H.P. 1800 RPM.
1—1/6 H.P. 1200 RPM.
6—1/8 H.P. 1800 RPM.

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1—40 K.V.A. 2200/110 Volts.
1—30 K.V.A. 2200/110 Volts.
2—25 K.V.A. 2200/550 Volts.
2—15 K.V.A. 2200/550 Volts.
2—15 K.V.A. 2200/550 Volts.
5—10 K.V.A. 2200/550 Volts.
6—7½ K.V.A. 2200/550 Volts.
5—5 K.V.A. 2200/550 Volts.
3—3 K.V.A. 2200/550 Volts.
2—2½ K.V.A. 2200/550 Volts.
2—6 K.V.A. 2200/110 Volts

D. C. MOTORS & GENERATORS

1—40 H.P. 220 Volts.
1—35 H.P. 220 Volts.
1—17 H.P. 110 Volts.
1—8½ H.P. 125 Volts.
1—8 H.P. 120 Volts.
2—1/6 H.P. 32 Volts.

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1	25 hp.	C.G.E. 750 rev., starter, rails, pulley.	
1	10 hp.	T.H.E. 1500 rev., starter, rails, pulley.	
1	10 hp.	C.W. 750 rev., starter, rails, pulley.	
1	5 hp.	C.W. 1500 rev., starter, rails, pulley.	
25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND			
1	25 hp.	Ball bearing 750 rev., starter, rails, pulley.	
1	13 hp.	Lancash. 750 rev., starter, rails, pulley.	
1	7½ hp.	Fairbanks 750 rev., starter, rails, pulley.	
60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND			
1	20 hp.	T.H.E. 1200 rev., pulley rails starter.	
1	20 hp.	Westgh. 1200 rev., pulley, rails, starter.	
2	10 hp.	Westgh. 1200 rev., pulley, rails, starter.	
1	7½ hp.	Westgh. 1200 rev., pulley, rails, starter.	
1	7½ hp.	Ful. Wen. 1200 rev., pulley, rails, starter.	
1	7½ hp.	T.H.E.Co. 1800 rev., pulley, rails, starter.	
60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND			
1	7½ hp.	All Chal. 1200 rev., pulley rails, starter.	
1	15 hp.	C. Wheeler 1800 rev., pulley, rails, starter.	
60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND			
3	½ hp.	1200 rev. clutch type T.H.E.	
1	1 hp.	1800 rev. split phase Peerless.	
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2	2 hp.	Peerless, 110/220 volt, 25 cycle, 1500 rev.	
2	2 hp.	Wagner, 110/220 volt, 25 cycle, 1500 rev.	
3	1 hp.	Peerless, 110/220 volt, 25 cycle, 1500 rev.	
3	1 hp.	Wagner, 110/220 volt, 25 cycle, 1500 rev.	
7	½ hp.	Peerless, 110/220 volt, 25 cycle, 1500 rev.	
5	½ hp.	Wagner, 110/220 volt, 25 cycle, 1500 rev.	
1	1 hp.	Wagner, 110/220 volt, 60 cycle, 1800 rev.	
1	1 hp.	Westinghouse, 110/220 volt, 60 cycle, 1800 rev.	
4	½ hp.	Wagner, 110/220 volt, 60 cycle, 1800 rev.	
SPLIT PHASE			
2	1 hp.	St. Louis 110 volt, 60 cycle, 1800 rev.	
2	½ hp.	Menominee 110 volt, 60 cycle, 1800 rev.	
4	¼ hp.	Menominee 110 volt, 60 cycle, 1800 rev.	
4	¼ hp.	Ohio 110 volt, 60 cycle, 1800 rev.	
4	½ hp.	Menominee 110 volt, 25 cycle, 1500 rev.	

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250 VOLTS

GENERATOR			ENGINE		
K.W.	Make	RPM.	Cyl. Dimensions	Make	
10	General Electric	600	4 x 12	General Elec.	
25	General Electric	1000	10 x 12	Armstrong-Sigs	
30	Crocker Wheeler	1000	8 x 12	Chrysler-Taylor	
35	Triumph	1140	10 x 14	Ideal	
40	Northern	1100	10 x 10	Leominster	
50	Westinghouse	1000	10 x 12	Blackhawk	
60	Crocker Wheeler	1175	11 x 13	Waukegan	
75	Westinghouse	1000	12 x 14 x 20	Westinghouse	
100	General Electric	1000	17 x 14	Amos	
120	General Electric	1000	16 x 14	Hartshorn	
125	Westinghouse	1000	14-1/2 x 16 x 22	Amos	
130	Crocker Wheeler	1225	1 x 16 x 16"	Amos	
150	Ft. Wayne	1165	16 x 8 x 24	Buttala-Towse	
160	Bullock	1460	16 x 8 x 24	Buttala-Towse	
200	Westinghouse	1000	15 x 24 x 10	Belliss & Mor.	
250	Westinghouse	125	15 x 25 x 21	Buckeye	
300	Crocker Wheeler	125	20 x 40 x 36	Mel. Seymour	
375	Allis Chalmers	120	15 x 40 x 36	Putnam	
400	General Electric	150	14 x 40 x 36	Ross-Saugan	
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1	1½	General Electric	1800
1	1½	Westinghouse	1800
1	1½	Elec. Blower Co.	1800
4	1	General Electric	1800
2	1	Fairbanks Morse	1800
2	1	General Electric	900
1	5	General Electric	1800
1	5	General Electric	720
7	7½	Allis Chalmers	1200
2	7½	Westinghouse	1130
4	7½	General Electric	1200
6	7½	Fairbanks Morse	1200
3	7½	Burke	1200
5	10	General Electric	1200
4	10	Allis Chalmers	1150
1	15	Westinghouse	1700
4	15	General Electric	1200
1	20	General Electric	1200
4	20	Allis Chalmers	900
2	20	Allis Chalmers	1130
6	25	Allis Chalmers	1130
1	25	Allis Chalmers	1130
1	30	Westinghouse	1200
1	30	Allis Chalmers	900
6	35	General Electric	1200
Slip Ring 3	40	Allis Chalmers	865
Slip Ring 1	40	General Electric	1200
1	50	Crocker Wheeler	600
1	75	Allis Chalmers	720
1	75	Allis Chalmers	600

No.	H.P.	Make	R.P.M.
Slip Ring 1	75	General Electric	1200
1	200	Allis Chalmers	600
1	250	Westinghouse	600
2	125	Crocker Wheeler	900
2200 Volt			
1	100	General Electric	600
Slip Ring 2	125	Crocker Wheeler	900
Slip Ring 2	200	Allis Chalmers	600
Slip Ring 1	450	Crocker Wheeler	327

DIRECT CURRENT MOTORS

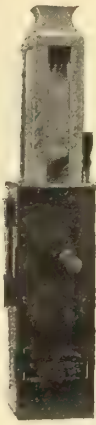
110 Volts

H.P.	RPM.	Maker
1/8	1800	
1/4	1800	
1	1800	Toronto Hamilton
1	1100	Lincoln
20	730/1250	Toronto Hamilton
		Siemens Bros.

220 Volts

1/2	1150	Rob & Myers
1/2	950	Deihl
3	530	C. G. E.
3 1/2	1550	C. G. E.
4	1125	Can. West.
5	950	C. G. E.
10	1400	Wood.
10	1300	Fort Wayne
20	640	C.G.E.
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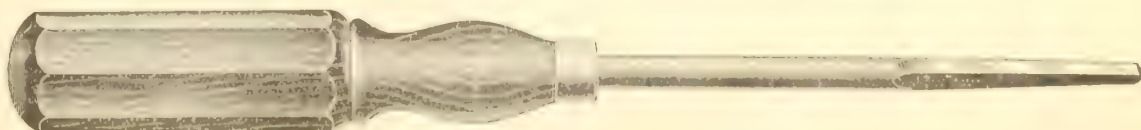
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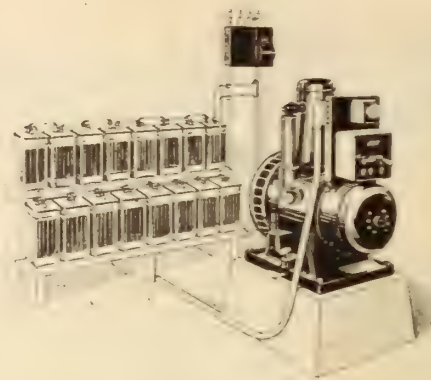
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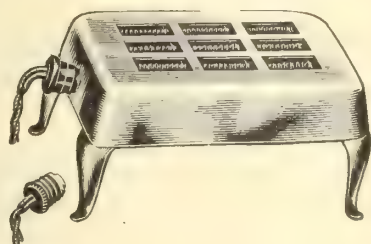
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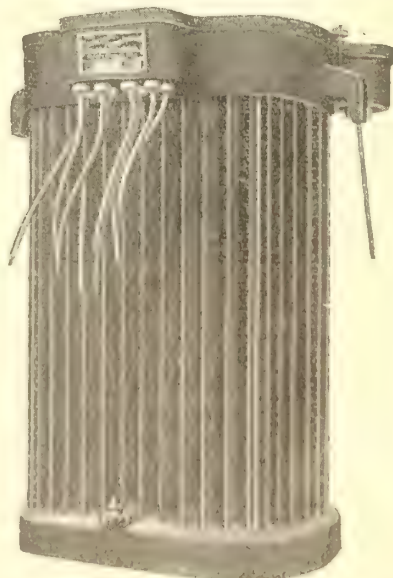
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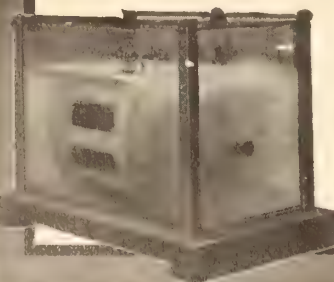
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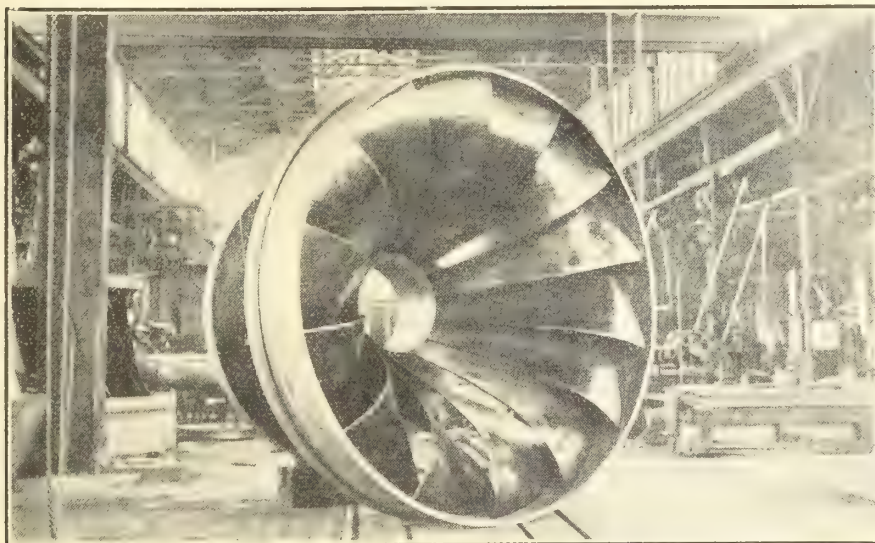
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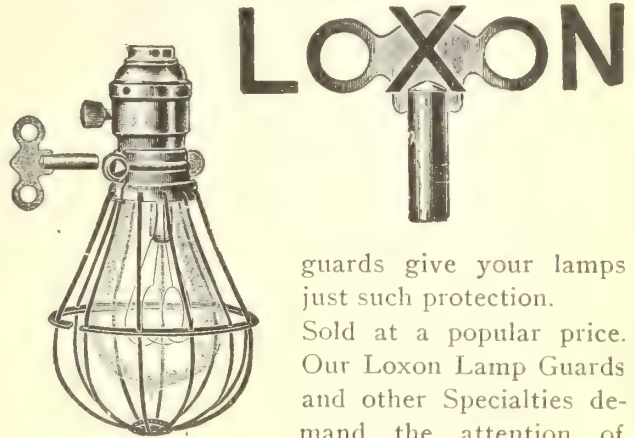
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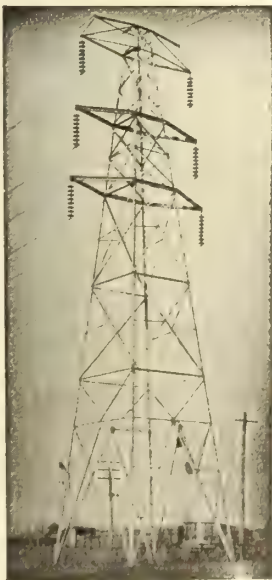
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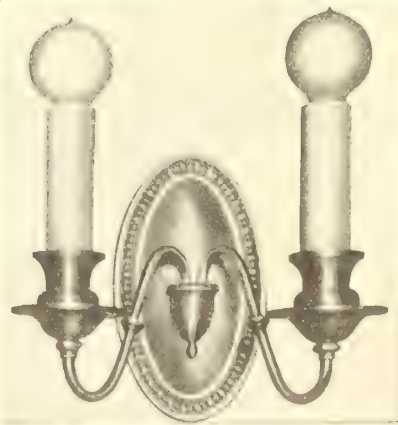
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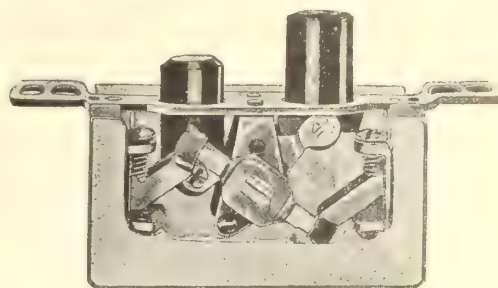
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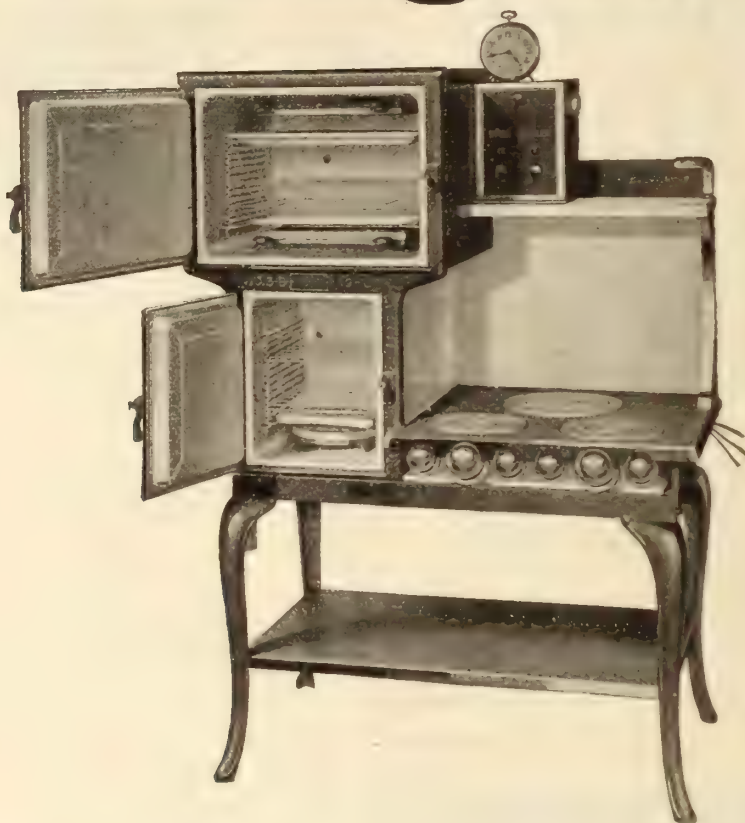
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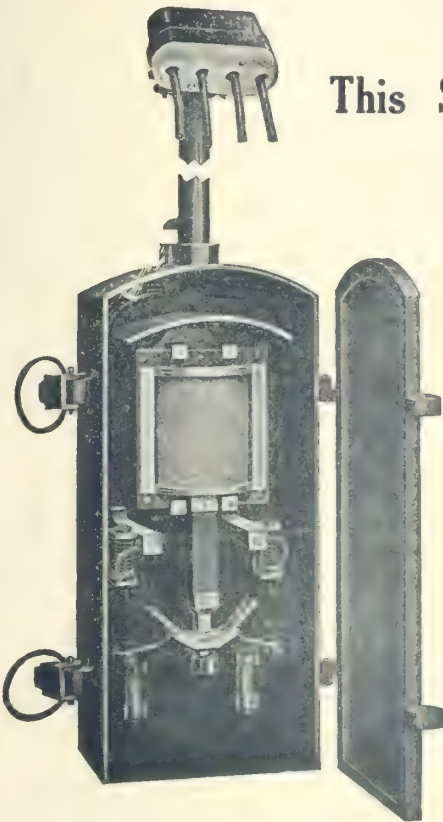
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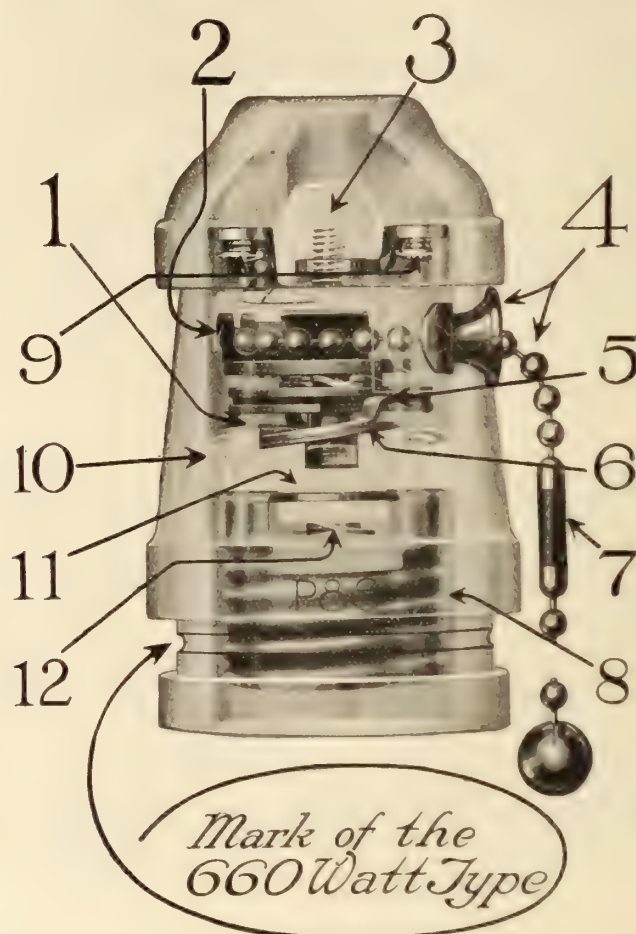


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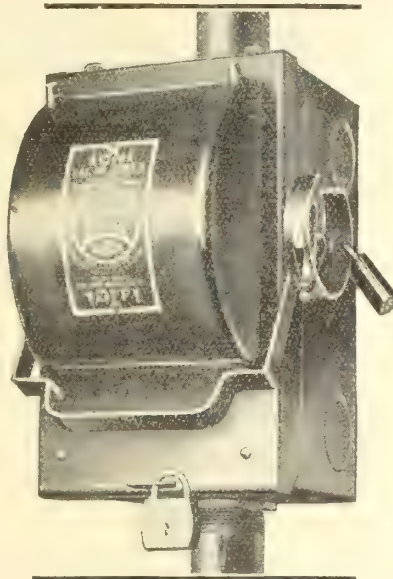
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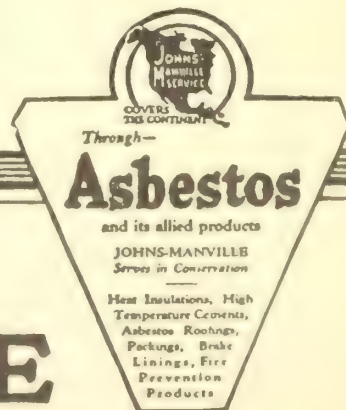
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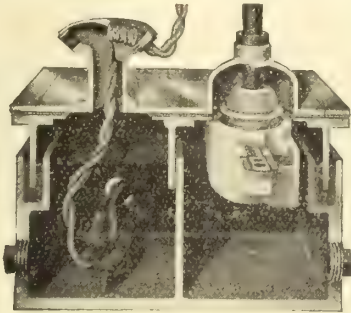
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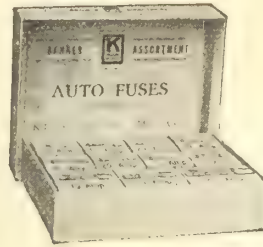
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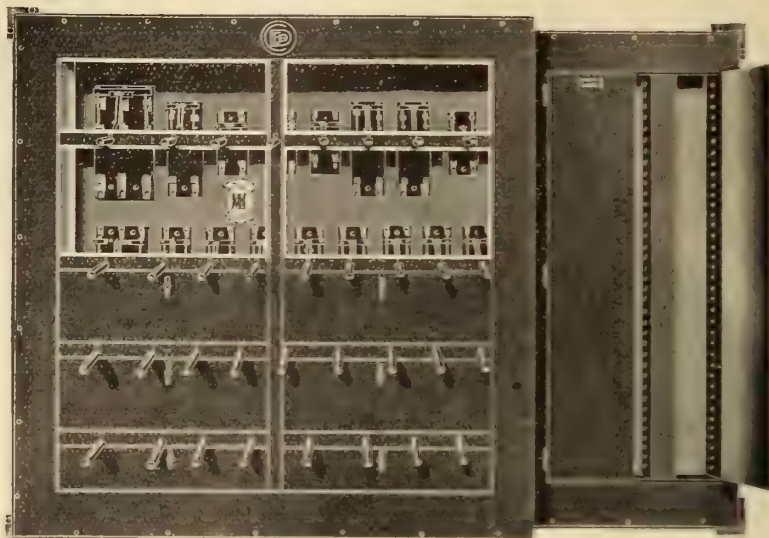
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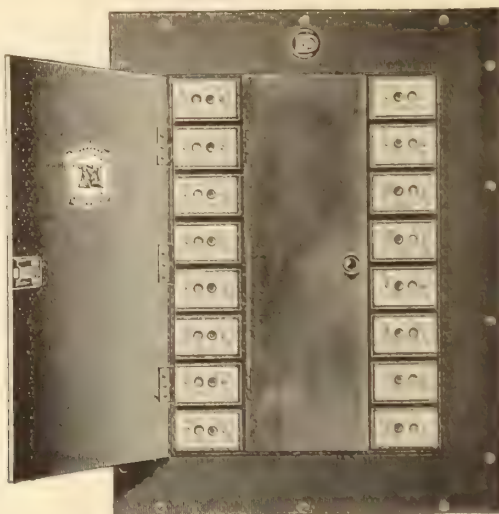
The above panel contains thirty-four Benjamin Knife Switches 10 Amperes to 200 Amperes, all 110 Volts. Cabinet is 78" High, 78" Wide, 12" Deep, with Magazine Panel attached.

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Standard Panel with Cabinet

This Dead Front Panel with Cabinet is designed to use the Standard Push Switch and 3-2 or 2-2 wire cutout, with inner door covering the cutouts and fuses. It is absolutely safe for anyone to operate.

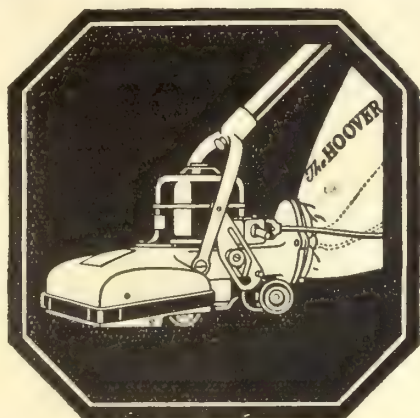
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It Bears . . . as it Sweeps as it Cleans

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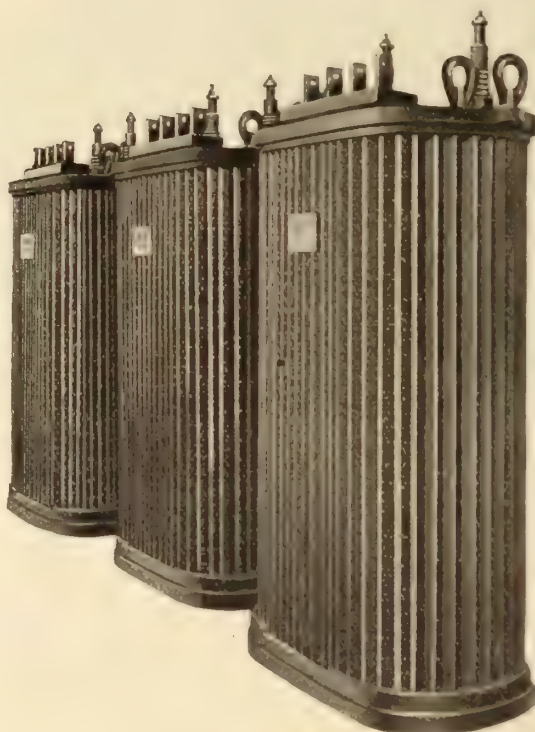
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Steel Bottom Welded to Corrugations — Cannot Leak
Other Exclusive Features in Mechanical and Electrical Design

Others may follow but we lead

The Packard Electric Co., Limited
St. Catharines, Ontario

401 Temple Building, Toronto

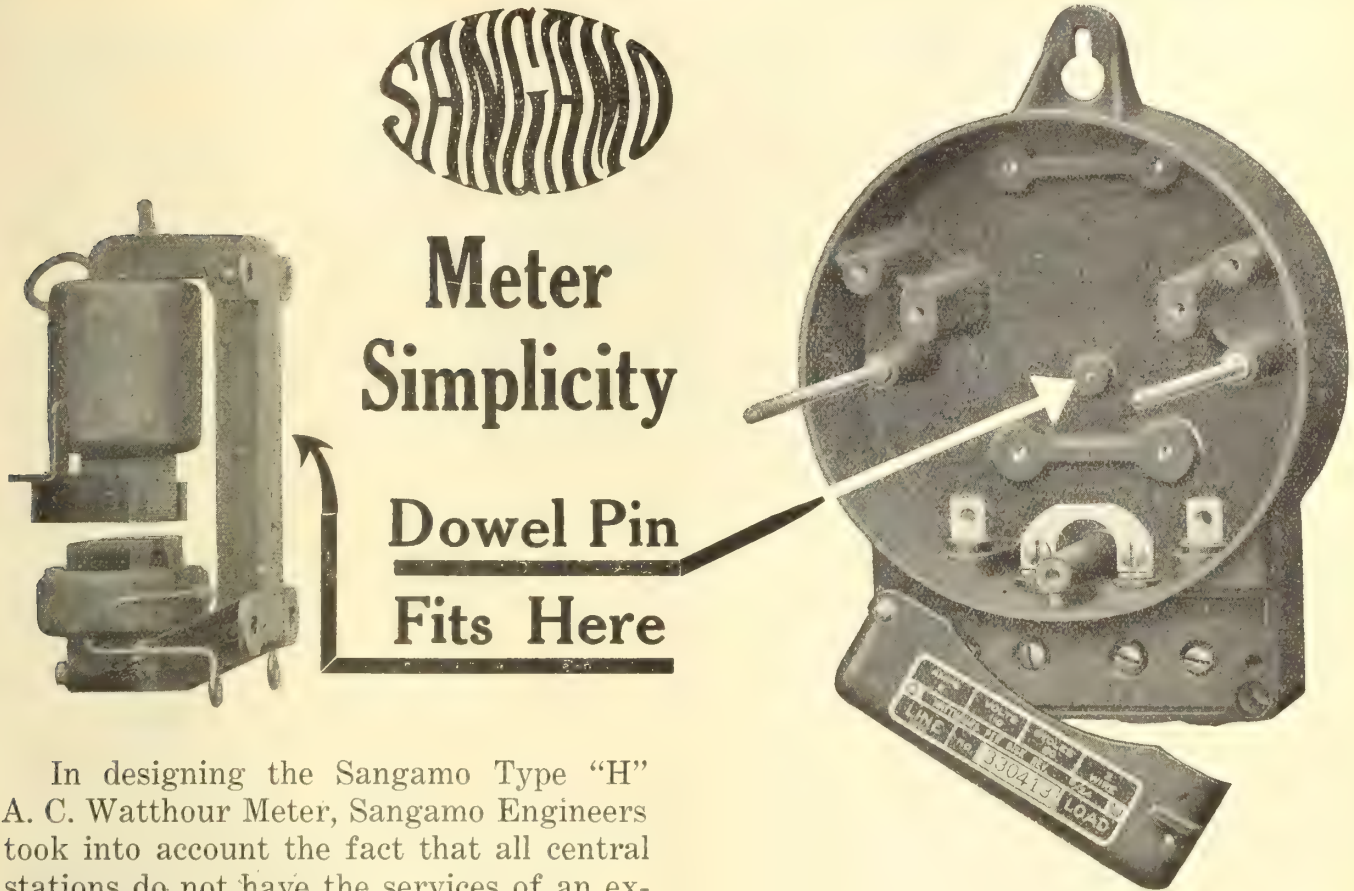
725 Power Building, Montreal

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Eastern Electric Co., Limited, St. John, N.B.

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In designing the Sangamo Type "H" A. C. Watthour Meter, Sangamo Engineers took into account the fact that all central stations do not have the services of an expert meter man, and as a result the mechanical structure of type "H" is such that any one of ordinary experience can take it apart, make replacements and assemble it again.

In fact there is only one way to assemble Type "H"—the right way.

For instance the various parts of the shunt and series magnets are accurately aligned by means of dowel pins. The shunt magnet as a unit is accurately located on the meter base by dowel pins. The meter train fits on the main grid only one way—the right way, and the slot in the worm-wheel bracket, engaging the upper bearing screw stud, insures proper depth of the wormwheel in the worm.

To replace the moving element it is only necessary to remove the upper and lower bearing screws, insert the element and drive home the bearing screws firmly into the grid. This is done without having disturbed the meter adjustment in any way.

These features all insure the interchangeability of meter parts. Any part from a Sangamo Type "H" meter of similar voltage and frequency may be placed in any other without seriously affecting the calibration.

The Sangamo Type "H" is the meter for your lines. Its many other desirable features will interest you. Write today for Bulletin No. 4618.

Sangamo Electric Company of Canada, Limited

2059

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Head Sales Office: MONTREAL

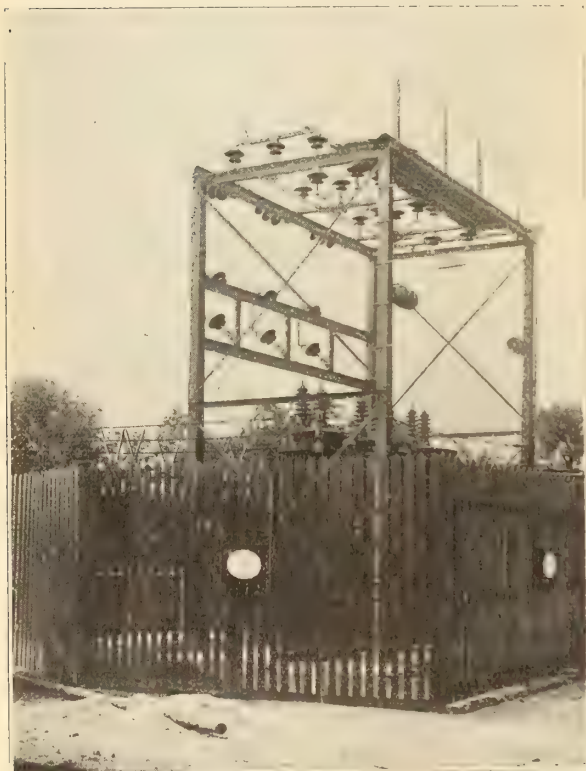


HIGH TENSION EQUIPMENT



**THERE ARE MANY GOOD REASONS
FOR USING "UNIT-TYPE" EQUIPMENT
BUT AN ESPECIALLY GOOD ONE
IS** That "UNIT-TYPE" Equipment
is a DELTA-STAR Product

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Unit Type, 33000 Volt, 450 K.V.A., Steel Tower Substation

Very naturally a variety of reasons enters in to the selection of Unit-Type equipment by engineers. Many are attracted by the design, others by its simplicity of construction, all-round usefulness and reliability.

But there is one reason standing out boldly above all—constituting by all means the most important factor, and it is that Unit-Type equipment is a DELTA-STAR product.

Since 1908 DELTA-STAR products have been used by engineers who demand the best and who will not permit lowering of standards. So the fact that Unit-Type is a DELTA-STAR product, establishes its position.



5 K.W., 13200 110 220 Farm Substation

When specifying Unit-Type equipment you know that it is designed, manufactured and sold by a seasoned organization—one that has had the time to develop and make a reliable product. We have the necessary experience.

Reputations are not built in a day, and do not happen through accidents. The DELTA-STAR reputation has been built up by the following policy—since 1908

Build equipment as good as human skill can build, and let responsibility for quality exceed every other responsibility. This is the principal on which DELTA-STAR does business with you.

DELTA-STAR ELECTRIC CO., CHICAGO

REPRESENTED IN CANADA BY

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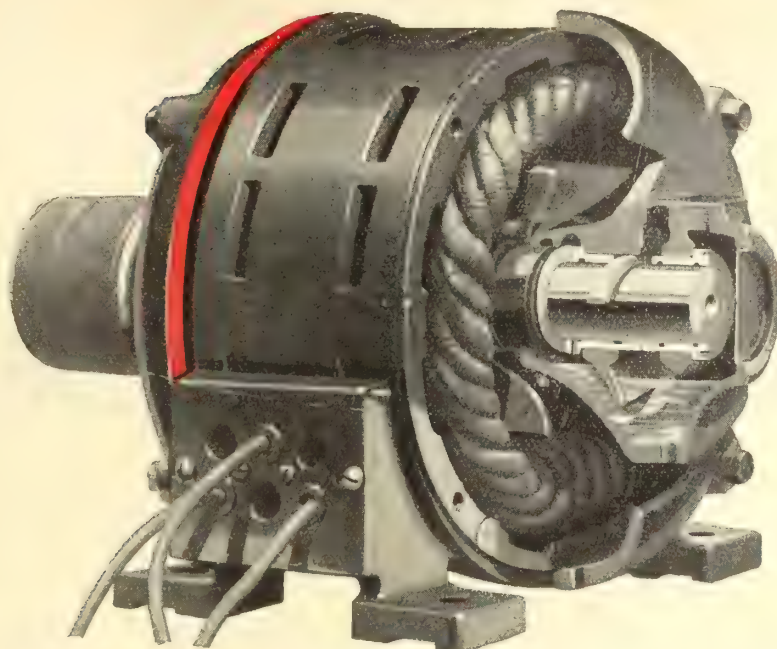
Windsor Ont.

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DELTA-STAR HIGH TENSION
EQUIPMENT

UNIT-TYPE INTERCHANGEABLE PARTS





Motor with section of end bracket cut away, showing how bracket protects the coils; also how air is circulated over coils for ventilation.

Built to Keep Everlastingly on the Job --- and Serve with Freedom from Repairs

Because it is so built that the common defects and weaknesses in polyphase motors have been eliminated, the Howell Red Band Motor has an established reputation for trustworthiness.

With enameled wire which is double cotton covered, super-slot insulation, patented bronze bearings, indestructible rotor and conservative temperature ratings, Howell Red Band Motor design and construction assure long-continued service. The Howell Red Band Motor is built to keep everlastingly on the job.

It has ample ventilating ducts, which permit free circulation of air, yet are so designed that they do not become clogged with accumulations of foreign matter, which if allowed to remain in the air ducts, cause the motor to become extremely hot in service.

A trap in the oil reservoir of the Howell Red Band Motor obstructs any movement of oil-laden air from the bearing housing towards the rotor and prevents bearing troubles caused by the drainage of oil from the reservoir.

It is because of the many superiorities in Howell design that in American industries everywhere implicit faith is placed in the ability of the Howell Red Band Motor to give never-faltering service.

HOWELL ELECTRIC MOTORS CO.

HOWELL, MICH.

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Montreal

Electric Motor & Machinery Company, Ltd.
417 St. James Street

Howell **RED BAND** **ELECTRIC** Motors

READY!

The Metal Molding Hand-Book

"For the Man on the Job"

Every contractor and wireman in the business needs this new Hand-Book—the most complete book ever issued on the subject of metal raceways for surface wiring. It gives full instructions—with many illustrations—for using National Metal Molding under all conditions. It also lists the various fittings and devices that are used in connection with Metal Molding. Because of its convenient size, the book can be easily carried and used right on the job. We will be glad to send you a copy, without charge. Write, or use the coupon below.



Fill in, tear out and mail this coupon

National Metal Molding Co.

12th Floor, Fulton Bldg., Pittsburgh, Pa.

Please send me a copy of your new Metal Molding Hand-Book "For the Man on the Job"

Name.....

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Company.....

G. M. Gest, Limited

Contracting Conduit Engineers

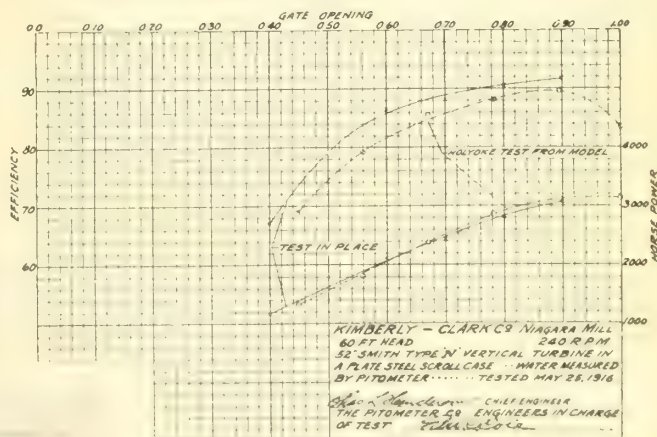
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RESULTS

JUSTIFY
INSTALLING
**SMITH
HYDRAULIC
TURBINES**



The year 1921 has on its
program an immense amount
of

**WATER POWER
DEVELOPMENT.**

If interested, ask for Bulletin "N"

S. Morgan Smith Co.
York, Pa., U. S. A.

H. B. VAN EVERY, Representative
405 Power Building - MONTREAL

Ward Leonard

Theatre Dimmers

*The original plate form—
Standard the world over*

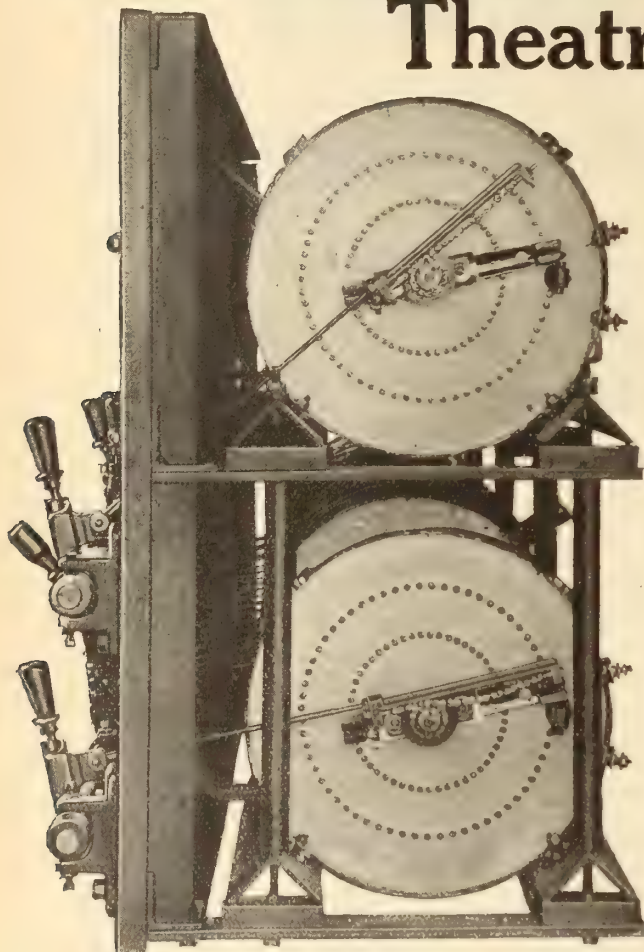
The only dimmer made with Vitrohm—Vitreous enamelled insulation—the impervious insulation which prevents oxidization of resistance element.

Vitrohm also holds the joint between resistance wire and terminal lead so that connections cannot become loosened or changed.

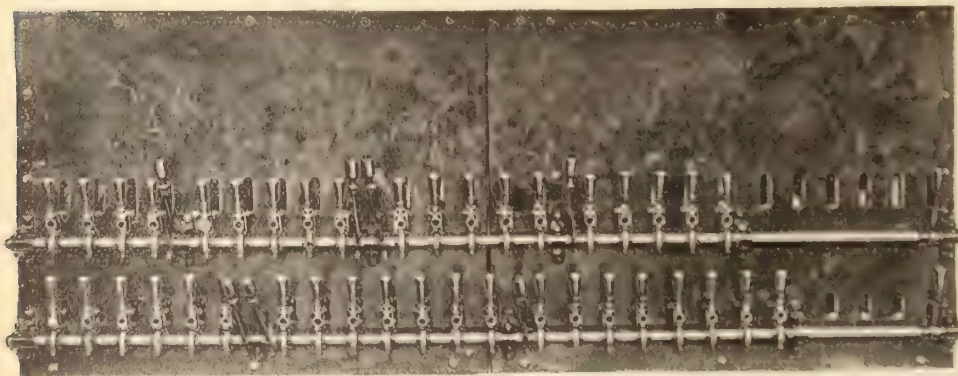
Ward Leonard Theatre Dimmers afford perfect control, providing gradual, imperceptible change throughout the entire range of the apparatus, without flicker or flash. They are compact in design and therefore economical in space requirements. Moreover they are very much lighter than other dimmers of the same capacity.

Ward Leonard Theatre Dimmers can be made to meet any condition as to arrangement of levers and location of plates. Remote control, top of switchboard, rear of board or wall mounting.

Large stock of standard size plates carried at factory to meet immediate demands.



End view of a two-high Dimmer bank with operating handles extending through the panel. Used by Toronto University, Toronto.



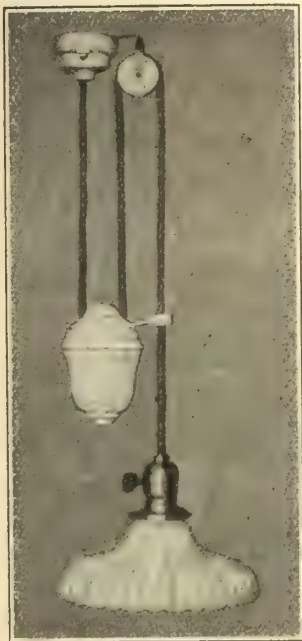
Front view of the Ward Leonard Dimmer Panel shown above.



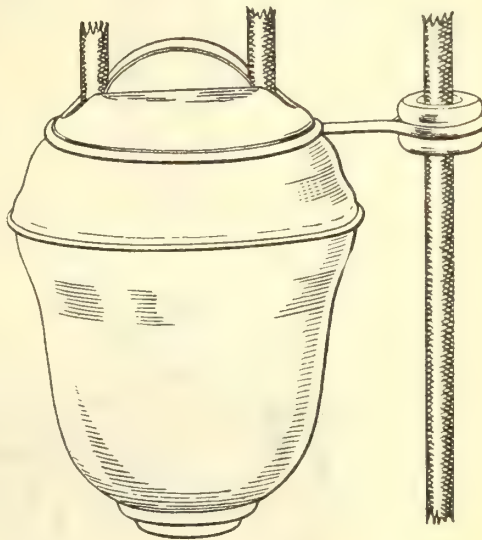
Ward Leonard Electric Company

Mount
Vernon,
New York

Stop and Read—This Interests You!



WE are pleased to put before you an unbreakable sanitary Counterweight which enables you to have a light where you want it when you want it, adjustable to any rosette in the ceiling, no yanking as the pulleys are so constructed that they move freely, no shade too heavy nor any too light for this little wonder.



Made from the best of material and packed in individual boxes, finished White Enamel, hydro approval number.

Manufactured by The Canada Brass Products Limited, 162 Craig Street West, Montreal

WHOLESALE DISTRIBUTORS: **FRANKE, LEVASSEUR & CO., LIMITED,** 150 Craig Street West MONTREAL

Used
From

Universally
Approved

Moloney
*A purely
Canadian made
Product*

Transformers
*All inquiries
receive prompt
attention*



Coast
to
Coast

Reliable
and
Efficient

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents: Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, Confederation Life Bldg., Winnipeg.
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U-RE-LITE



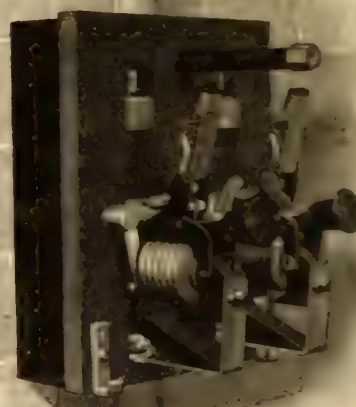
An I-T-E Circuit Breaker in a Steel Box

IT IS SO MUCH BETTER THAN A FUSED SWITCH THAT IT IS IN A CLASS BY ITSELF. IT opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

First to the left,
Then to the right,
Turn the handle
AND U-RE-LITE.



I-T-E Mechanism with the cover removed

is, in truth, a double pole, double coil Circuit Breaker designed to take the place of a pair of fuses and a knife switch.

Made in capacities of 60 amperes and under for D. C. circuits of 250 volts or less and A. C. circuits of 250 volts or less, single phase, the expense and delays incident to the blowing of fuses is overcome.

IF frequent fuse bills
Make you rave.
Install the U-RE-LITE
And save.

THE CUTTER COMPANY

Bank of Hamilton Building
Main Office and Factory

TORONTO, Ont.
PHILADELPHIA, Pa.

The Eden

Electric Washing Machine

Leads the Way

Live dealers who cater to high class trade will find the Eden the popular choice of electric washers.

Many exclusive features enter into its desirability and in every case clinch the sale.

The Exclusive Eden Features

The Eden Sediment Zone—traps all dirt as it falls from the clothes and keeps the wash water entirely free from the dirt particles.

The Eden Swinging Interlocking Swing Wringer locks in five positions.

The Eden Automatic Clutch.

The Eden Cylinder stops with the doors in the centre at the top.

The Eden requires no oiling.

Eden Dealer Helps

The Eden is sold only through the dealer—large stocks are carried in Toronto, Montreal and Winnipeg, and immediate deliveries can be made.

We will furnish to dealers, upon request, attractive advertising folders and display cards. Advantages can be taken of the "Eden Time Payment Plan." Write for full particulars.

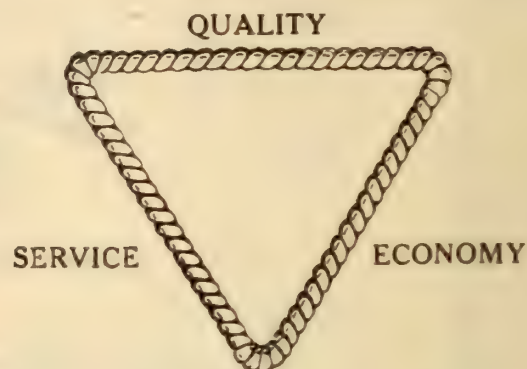
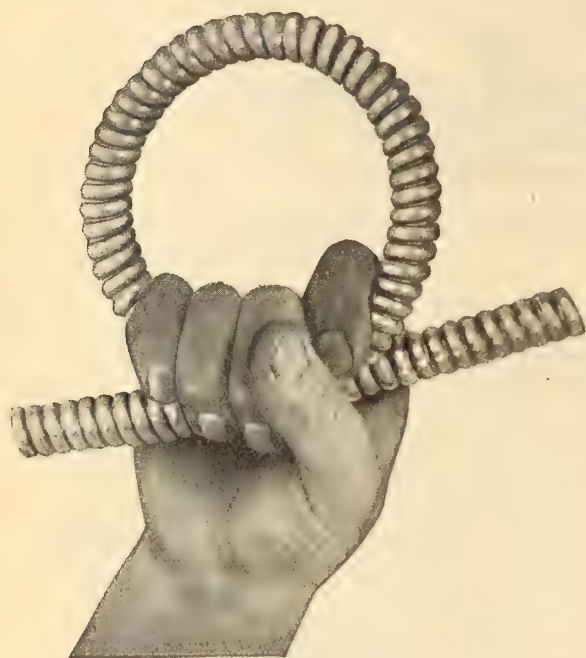


A Canadian Corporation

Gillespie-Eden Corporation, Limited
266 King St. W. - TORONTO

Western Distributors: Great West Electric Co., Winnipeg, Man.

Made in Canada



Tri Duct — Non Metallic Flexible Conduit
Tri Cable — Flexible Armored Conductors
Tri Steel — Flexible Steel Conduit
Tri Flex — Flexible Metallic Gas Tubing
Tri Tube — Flexible Automobile Tubing

Canadian Triangle Conduit Co.

LIMITED

Office and Works - TORONTO

The Products of this Company may be used wherever true quality and service are appreciated. TRI DUCT, for instance, is packed 4 curls of 250 feet each in wire bound wood containers, absolutely insuring arrival of goods in perfect condition.

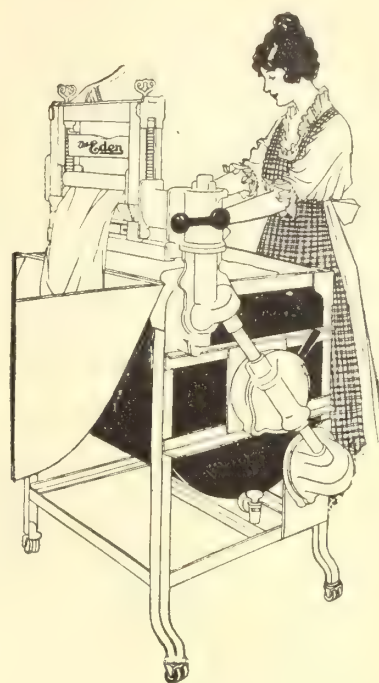
Exclusive Selling Agents:

Conduits Company, Limited

33 Labatt Avenue - TORONTO

When Wash-day is Not "Blue Monday"

The approach of wash-day is looked upon with dread in many households, where old-fashioned methods are still in use. There is a broad field for the dealer who stocks



The **Eden**

The machine that meets every requirement of wash-day labor saving. Whenever the Eden is used, the work of doing the family "laundry" is reduced to an operation that is simplicity itself. There are no complicated parts to confuse, as it has been designed from the woman's point of view and hence very popular with housewives for this reason.

A Demonstration by the dealer is invariably followed by a sale, as its superiority over machines sold for a much higher price, is seen at a glance.

The dealer who carries Eden Washing Machines is assured of increasing sales and attractive returns.

WRITE FOR PARTICULARS

Great West Electric Company, Limited
Winnipeg, Man.

Antiquated, inefficient Transformers certainly eat deep into your Profit curve



CANADIAN CROCKER-WHEELER TYPE "H" SERVICE TRANSFORMERS

HIGH EFFICIENCY

NO one can afford to waste anything these days—least of all electrical energy. So much pivots on your service transformers that you must be discriminating in your choice. We confidently say "Order Canadian Crocker-Wheeler Service Transformers. They'll more than please you." Tanks are welded sheet steel—long life. Sizes up to 100 K.W. for 60 and 25 cycles. Ample stocks always available.

Canadian Crocker-Wheeler apparatus and service are available at all of the branches of the N. E. Co. at:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL



Reputation

WHEN the dealer shows a Robbins & Myers Fan to a customer, he does so with the knowledge that the customer already knows the high quality of the fan and the guarantee which goes with it.

Years of dominant advertising in the leading magazines and the quarter century service record of the hundreds of thousands of R & M Fans in use the

world over, have made the R & M monogram on the guard and the service it stands for known to practically every prospective fan user. It is a guarantee of satisfaction which is more convincing than any demonstration the salesman can make.

The R & M Reputation insures easy sales, profitable prices and a growing fan business for the dealer.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans

Appliances That Are Judged By What They Can Do

Women judge stores most often by the lines that are carried in stock.

And they judge the lines by the satisfaction they give.

Stores that carry The New Canadian Beauty Appliances are better patronized—because Canadian Beauty Appliances have been bought by women, tested thoroughly and have given service absolutely up to their highest expectations.

The New Canadian Beauty Electrical Appliances

please purchasers in every way—appearance, performance, length of life and usefulness—in fact, every article in the entire line meets the most exacting requirements of all women.

The public are keenly interested in electrical appliances. The public realize the immense advantages of the electric iron, the toaster, the grill, the heater, the percolator, etc.

Men and women are beginning to discriminate among the different brands of appliances and in this shuffle the Canadian Beauty line has received a very large share of the public preference.

Our heavy national advertising is making its influence felt.

Have you benefited any? Or are you carrying a less popular and less advertised line?

As you know, people are no longer buying in a haphazard fashion.

In the New Canadian Beauty Appliances the public get service—durability and smart appearance.

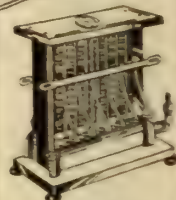
It is a line rich in selling talk—real, truly, honest-to-goodness selling talk.

Order from your nearest jobber or write us direct—tonight.

RENFREW ELECTRIC PRODUCTS, Ltd.
TORONTO RENFREW, ONT. WINNIPEG

Renfrew
Electric
Products
Limited
Renfrew, Ont.

Canadian Beauty



Toaster

Canadian Beauty



Three-heat
Grill

Canadian Beauty



Iron

Canadian Beauty



Stove

Canadian Beauty



Majestic
Heater

Canadian Beauty



Percolator

Canadian Beauty



For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

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The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for \$2.00 per annum. United States and foreign, \$2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean, Limited.

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Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31.

Toronto, February 1, 1924

No. 3

More Statistical Details for Electrical Industry

An interesting discussion has been running through the last few issues of the Electrical News regarding the collection of more detailed statistical information for the electrical industry. The point has been made repeatedly that, since the statistical department of our Dominion Government is maintained for the purpose of supplying useful information to the various industries, we should co-operate with them and so obtain **their** co-operation, in obtaining something a little nearer the ideal.

There does not seem to be any sign of antagonism on the part of the Government to giving information in greater detail but, as can easily be realized, this is a technical matter and the statistical department of the Government is just naturally not fully aware of the lines along which improvements might be made. They show evidence, however, of willingness to meet suggestions, and these suggestions, it seems to us, should come from the industry itself.

It has been noted in some of the letters that the Electrical Manufacturers' Association and Electrical Jobbers' Association, both of whom are vitally interested in this question, should be the proper organizations to prepare a schedule for presentation to the Government. This appeals to us as being the correct course. Not only have they the necessary information and organization, but they are in a position to

impress the Government with the importance of the industry they represent. It is scarcely possible that any reasonable request for re-organization of the electrical statistics department, coming from such august bodies as the Canadian Electrical Manufacturers' Association and the Canadian Electrical Jobbers' Association would be met with anything but the readiest co-operation on the part of the Government.

It would seem to be a matter that may be taken for granted that statistics in greater detail is really something to be desired. There are organizations it is true who feel that they already have acquired, through heavy expenditure, information of a valuable kind not possessed by their competitors, and that if the Government should undertake to place just such information as this before the industry at large their position of vantage could not be maintained. We don't know whether this is the feeling in only one or two isolated cases or whether it is fairly general, but we do feel that in the interests of the whole industry such an argument should not be seriously advanced. It is true, we are all in business to make a living, but it is also true, and pretty generally recognized, too, that anything that helps the industry as a whole helps every individual connected with it.

We trust, therefore, now that a considerable amount of interest has been aroused, that the matter will be taken up by the organizations named, in which case we have little doubt that the statistical department of the Dominion Government will be found ready to acquiesce in any reasonable suggestions.

Increasing Commercial Application of X-Ray Apparatus

Visions of a new era to commence with the commercial use of the X-Ray are indulged in by members of the B. C. Electrical Co-operative Association who listened to an address delivered by Dr. C. Wesley Prowd of St. Paul's Hospital, at the regular club luncheon in the Vancouver Hotel, January 7. Mr. E. M. Britton, San Francisco, managing editor of the Journal of Electricity, who was in Vancouver for the day, also addressed the gathering. He mentioned the 3,000,000 or more horse-power undeveloped in British Columbia and strongly urged co-operation with the power companies, stating that unless developments were carried on, electrical contractors and dealers could not hope to enjoy the increased sales and work that power development brings in its train.

Doctor Prowd showed the various types of X-Ray instruments which have been used for the past twenty-five years, in order to illustrate the remarkable strides that have been made. He dwelt strongly on the danger which has existed in the past for the operators, who were constantly exposed to the X-Ray, and then told of the various uses to which the world has put this remarkable invention.

"During the Great War," Doctor Prowd said, "every aeroplane and all bombs and other explosive containers were strictly tested by X-Ray apparatus. In many cases defective bombs and flaws in material which was to be used under great strains were detected, and without doubt many lives were saved. Among other uses to which the X-Ray is put are the examining of cargoes; testing of diamonds; searching for defects in steel and iron; determining the composition of alloys; and many others." Dr. Prowd prophesied that wonderful strides will be made shortly in the field of commercial application of the X-Ray and mentioned the fact that practically all of the great universities have appointed physicists who are to devote their entire time to the study of radiation. He said that the X-Ray appliance of the future will be merely an ordinary trans-

Necessity of Increased Production—Manager of Winnipeg Hydro-Electric System Speaks on Labor Doctrines—Danger of Restricted Output and Benefits of Mutual Confidence

The Manitoba Electrical Association held its first luncheon for 1921 on Thursday, January 6th, the speaker of the day being Mr. J. G. Glassco.

In the course of his remarks Mr. Glassco said that he did not intend addressing the meeting on light and power questions, as he felt sure that everyone, including himself, was fed up with this subject.

He intended to speak on increased production, or rather that feature of the subject dealing with labor,—its output and reward. Production had been greatly reduced through several causes, as compared with pre-war days. A reaction following the war and certain doctrines to which labor adhered, as well as a distinct shortening of hours in the working day were contributory causes in the falling off of production. The universal cry was "increased production." He said that it was in danger of being distorted to such an extent that it might become only half a truth with the power of the appeal gone out of it.

Increased production is absolutely necessary whether any reconstruction of our social system be undertaken or not, whether we become Bolsheviks, Communists, or Third Internationals, the State must remain solvent, and only by in-

ing of envy and jealousy amongst individuals thus challenging the solidarity of labor.

Mr. Glassco discussed at some length the recent measures adopted in England to overcome these difficulties, and referred to the Priestman method, which is being carried out satisfactorily by the coal miners in England. This method adheres to the "same work, same pay" doctrine but supplies an incentive to increased production by spreading a bonus over all the employees of the shop if a certain normal output of the establishment is exceeded.

The speaker further expressed his opinion that if the workers could be insured against unemployment and paid on a piece work system, the rates being fixed by committees on which the men are equally represented with the employers, and with a further provision that the men can appeal against inequitable rates, then labor's objection could be fully met and production stimulated throughout the land.

No heroic remedy can be applied to this national problem, but we should remember that we have a great deal to be thankful for, and that the average level of human life has risen very much in the western world during the last fifty years, and the speaker was convinced that it would continue to rise in the future.

The employer and worker must have mutual trust and confidence in each other. There must be a better spirit, more good will and better understanding between the two.

In closing his speech Mr. Glassco made some very touching remarks regarding those who fought and died in the great war, and the ceremony which recently took place at the burial of the unknown warrior in London.



Mr. J. G. Glassco.

creasing our national productive effort can we achieve this result.

Canada, during the war, was converted from a debtor to a creditor nation, but for the year just passed the balance of trade has once more swung against us, and if Canada is to retain the position of advantage which the war placed her in, production must be increased.

The doctrines which labor adhere to are the "Restricted Output" theory, and the "Same Work, Same Pay" theory. The former doctrine, concerning restricted output, is now being repudiated by all labor leaders, as it was shown that this doctrine was false in so far as it did not postpone the day of unemployment but on the other hand would inevitably bring it nearer.

Labor adheres to the "same work, same pay" doctrine largely because the old piece work system which permitted some classes of workers to draw different pay created a feel-

The Telephone as a Pioneer in the Prairie Provinces

In an address before the Montreal Electrical Association at the regular luncheon held at Montreal on January 19th, Mr. J. McMillan, manager of the Canadian Pacific Railway Company's telegraph system, described the work done by the pioneers of the telegraph in this country. Mr. P. T. Davies, of the Southern Canada Power acted as President.

Mr. McMillan referred chiefly to the development of the telegraph in the prairies. The first telegraph connection between Fort Garry (Winnipeg) and Pembina was a one-wire line, and was effected on November 28th, 1871. It was controlled by the North Western Telegraph Company. Five years later, the line had been extended by the Government to Edmonton.

The first C.P.R. telegraph line between Winnipeg and Prince Arthur's Landing was a line carrying two wires, and completed about the end of July, 1883. In 1885 rebellion broke out in the West, and while the railway company continued the construction of the railway line, the government built a telegraph line from Dumore Junction to Fort McLeod, the operations being covered by troops and mounted police. Mr. McMillan described his personal experience as one of the pioneers.

An interesting memento of the early days of the telegraph was a copy of an original message despatched from Toronto to St. Catharines, dated August 28, 1848. The rate at that period was one shilling three pence for ten words in the Toronto area.

Mr. H. M. Hopper, Secretary-Treasurer of the New Brunswick Power Company and formerly Manager of the Eastern Electric Company has returned from leave of absence until March 1st, 1921, at which time the resignation will become effective. He has been connected with the street railway of St. John, N.B. for twenty-four years. Up to the present — steps have been taken to fill the position made vacant by Mr. Hopper.

Brief Review of Developments in the Electrical Industry During the Past Year

**Improvements in Merchandising and Tendency Towards Super-Power Plants the Outstanding Features—Tremendous Demand for Small Equipment and Devices
Members of the Trade Optimistic Regarding the Outlook**

It is the usual thing during the first month of each year, after the Christmas rush is over, and we get a little breathing space, to sit back and consider just how much we have accomplished during the past twelve months. This habit is valuable in that it encourages us to go forward during the coming year; also in that it gives us our bearings more accurately, enabling us to see things in their proper perspective and rate them at their proper value, thus leading to the elimination of certain more or less useless activities and the determination to concentrate on others.

In the electrical business, looking back is always pleasant because even over the short space of twelve months we have invariably accomplished a great deal. This may be due partly to the fact that the industry is in its infancy, but we think it is also due in large measure to the further fact that the men in the industry are as a class exceedingly aggressive, keen and above all optimistic for the future. During the past year we have been in the fortunate position of seeing other lines of trade depressed, while the electrical business jogs along, if somewhat quietly, at least very smoothly and hopefully. To-day there are no pessimists among the electrical men. The industry does not breed pessimists nor tolerate them.

Super-power Plants.

There have been many developments in the electrical industry during the past year, many of which are almost too well recognized to bear repetition. Perhaps the one thing that stands out to-day on the engineering side is the tendency towards the concentration of power development in a smaller number of larger plants. The idea apparently first took root in England, where innumerable small developments were to give place gradually to better organized large unit developments covering wide areas. This is made possible by the rapid developments that have taken place in the capacity of steam turbines and electric generators. One firm reports that steam turbines of greater than 25,000 kw. capacity were placed on order during the year to the extent of about half a million kw. One of the units was a 60,000 kw. unit, and generators as large as 32,500 kv.a. have been placed in operation. The larger generating apparatus, of course, has involved similar developments in transformers and transmission. The same company speaks of a 23,600 kv.a. transformer for operation at 132,000 volts, and a group of seven 17,000 kv.a. transformers, single phase, to operate at 220,000 volts.

Electrical Merchandising.

The other real outstanding development in the industry during the past year is the noticeable progress that has been made in electrical merchandising. As a matter of fact the two developments naturally move side by side. If power is developed it must be consumed, or vice versa, the demand for greater consumption assumes a demand for great development. In the past the capacity of most of our plants was absorbed by industries or in providing light, but during the year just ended the consumption of current of household devices has taken a leap forward and threatens to embarrass our central stations. For a time the demand for electric energy in the province of Ontario had created a condition

that the available supply could not meet, but this we hope is now a thing of the past. The progress has been so rapid, however, that we cannot but think that it is in this direction the most noticeable developments will take place in the next few years. Electrical devices have met with such universal favor that their continued popularity seems to be established without the shadow of a doubt. This being the case when only a small percentage of the field has been covered, we feel that a warning to central stations to be on the lookout for a "flood" is entirely in order.

Small Motors.

In line with the development of the merchandising end of the industry has come a greatly increased demand for small motors. One company reports "there has been an enormous demand for fractional horse-power motors for operation of labor-saving devices in homes, offices, stores, and industry. Large quantities of motors have been supplied for driving washing machines, ironing machines, vacuum cleaners, and other household appliances. In offices and stores these little motors are used extensively in driving adding machines, calculating machines, meat and coffee grinders and a number of other labor-saving devices. In industry they will be used more and more in connection with portable electric tools, air pumps, water pumps, and foundry riddles. It is very gratifying to note that these small motors have been remarkably successful in operation, even on many appliances which are subject to little or no attention, and often have much abuse and overload." During the year a new company has been established in Canada for the manufacture of small motors, and reports that up to the present time its product has been practically absorbed by one vacuum cleaner company. This vacuum cleaner company, by the way, figures on placing 45,000 cleaners in Canadian homes during 1921.

The Modern Drive.

All the other industries now appear to have placidly accepted the argument that electric drive is the modern drive. Where new industries and factories are being built, individual electric drive is being established, and in the older plants it is rapidly replacing the group drive. This is true in the pulp and paper industry, shoe manufacturing industries, woodworking and indeed is almost universal.

Radio Apparatus.

Perhaps it is as a result of the war, which had a stimulating effect, but the development of radio apparatus for domestic and general use has made rapid progress. Two or three years ago one had to institute a careful search before one could get any information regarding the cost and application of this equipment, whereas to-day there are many electric stores devoting a department to radio development.

This is a phase of the industry that appeals to "the boy" and in addition has a very practical side. Here again we believe that the next half dozen years will see a tremendous increase in demand for equipment.

Electric Battleships.

Another item that has been commented on to a very considerable extent is the utilization of electric drive for ships.

Electrical motors up to 15,000 horse-power have been developed for ship propulsion, and the United States has in process of construction at the present time four 60,000 horse-power battleships and two 180,000 horse-power battle cruisers, all electrically operated.

In order to get as broad a perspective as possible of the situation we recently sent out a number of letters to manufacturers and others and have in reply some very interesting data. Speaking first of the tone of the letters, it must be noted that they are very optimistic. One of them runs as follows:

Depression Has No Foundation in Fact.

"What strikes me as particularly interesting is the fact that while all other trades, such as clothing, shoes, textiles, sugar and other necessities of life have experienced quite a slump, the electric trade has not suffered to any appreciable extent. The reason for this is no doubt due to the fact that the electric business is about the only one where prices were not increased to any appreciable extent. Depression in our industry has no foundation in fact."

Another suggestion is to the effect that if Canadian manufacturers would guarantee present prices for a period of six months it would inspire confidence in contractor-dealers who could explain definitely to the ultimate consumer that there is no chance of a fall in prices.

Manufacturer Helps Dealer.

A company manufacturing suction sweepers reports that during the year "our business has steadily increased, and this has been accomplished, in our opinion, through getting the most satisfactory dealers possible in the different communities and by the excellent co-operation of our dealers in distributing the helps furnished to them and displaying our product in their windows." This is simply in line with our previous statement that the merchandising of electric goods is rapidly being put on a better basis.

Turbine Business Looks Good

A manufacturer of hydro turbines in the United States speaks of the hesitancy on the part of the private interests to place orders for equipment, due to the attitude of the government regarding the water-power situation. A Canadian manufacturer, however, speaks in much more hopeful terms. He mentions that peak prices have been reached and apparently passed, for both raw material and wages, and that he anticipates very great activity during 1921. Canada has not sufficient water powers to justify us in wasting them, but enough to make it urgent that we should not delay development. Undoubtedly the near future will see many plants both small and large established at many points in Canada. The extent of our water powers, and their value as a commercial asset, is something our people in the main do not realize.

The suggestion is made by one of our correspondents that may well receive the attention of the whole industry. There is no means at the moment for making reliable tests of water turbines, and this suggestion urges the erection of a testing station by the provincial government. We heartily agree with the suggestion merely adding the recommendation that it should be made by the Dominion Government rather than the provincial.

Co-operation.

Another letter speaks of the year 1920 as having "effectively started a real spirit of co-operation among the electrical interests in Canada," and continues, "I feel much greater progress was made last year than ever before towards bringing the electrical interests together, and for that reason, if for no other, I believe we can be optimistic for the future. I think the electric industry has more reason for optimism

regarding the year 1921 than we have ever had at the beginning of any year in the history of Canada."

An Indicating Demand Meter.

Mention is also made of developments in the metering field. One company has developed an indicating demand meter and the experience following the installation of these meters is that customers express satisfaction on account of being furnished with definite and accurate information. The result where this meter is used is that in some cases meter bills are reduced, in others increased, but the fact that the degree of accuracy in arriving at the result is so very much greater, meets the customer's approval. This demand meter is being developed in the graphic form, the great advantage in this case being that instead of having to calculate the graphic chart the highest point registered is the point required, and the personal element is eliminated.

Electric Welding.

Electric welding has made considerable progress. During 1920 the successful welding of large iron castings subject to heavy working stresses, without pre-heating, was accomplished. This represents a big saving in the actual time of repair, to say nothing of the advantages gained by the shorter period of shutdown. Electric welding promises to take an increasingly important place in the industrial side of our national development.

Filled With Orders.

As typical of the general optimism among manufacturers writes: "For this time of year we have never carried more unfilled orders in our history than we do at the present time, and we have so much confidence in the electrical industry in Canada for the coming year and years that we have filled our warehouses with stock and finished material."

Refinements in Lighting.

In the lighting field the developments appear to be progressing largely in refinement. These refinements are being run on floor lamps and decorative shades; perhaps almost to the same extent, of wall brackets. It is evident that our ideal of the functions of lighting is undergoing a gradual change, and that while fixtures and lighting units in general were formerly considered from their utilitarian standpoint, we are coming to look upon them as part of the decoration and furnishing of the home. A prominent fixture manufacturer advises us that the tendency is towards standardization, and that an increasing number of manufacturers in the United States and Canada are discontinuing special work and confining themselves to standardized fixtures only. This will mean a smaller and greater output and consequently reduce the cost of making.

SUMMARY. It would be said that the industry, after the year 1920, has settled itself down to work, and is now ready to march forward. Deliveries of raw material, which a year ago were uncertain, are now fairly dependable, and in consequence the same is true of the finished product. The industry in Canada perhaps shows greater signs than ever of becoming self-contained. If the spirit of co-operation between manufacturer, jobber and retailer, which has been evidenced on certain occasions, can be brought to bear permanently—if every section of the trade can take such a broad view of the situation that he will understand that success in his own particular line is impossible without the success of the others—then we shall have a team that will work smoothly and efficiently. Two things only are necessary—confidence and co-operation.

The new "Plateau Exchange" of the Bell Telephone Company of Canada, Montreal was opened in January 1921.

The Town and City Households of
Canada, Electrically Speaking, are

Only Seven Per Cent. Saturated

This is Shown by Statistics Just Gathered from Two Hundred and Fifty Central
Stations—No Sign of "Depression" in Electrical Industry

In the course of a lecture the other day on certain phases of banking, Stephen Leacock stated that the selling price of an article is not dependent upon the cost of production of that article.

Selling price is regulated by demand.

How does this apply to the electrical industry?

There are two theories advanced with regard to increasing the turnover of electrical equipment in the immediate future.

The first is—reduce prices.

The second is—redouble our sales efforts.

The decision as to which of these two is the better course seems to be given by the statement that "selling price is regulated by demand." If the demand for electrical equipment is limited, that would suggest price reduction. If on the other hand the demand is unsatisfied a better course would seem to be to maintain fair prices and give better service.

The whole matter then hinges on "demand." Is there a big, urgent, unsatisfied demand for electrical equipment? If there is not, can it be created? In other words—is the field saturated?

Some weeks ago we set out to find the answer to this question. We had often heard expressions of opinion by this one and that, but we wanted facts. We wanted to know just to what extent the people of Canada are already supplied with electrical appliances in their homes, for upon this depends very largely the operations of the central stations, the manufacturers and the jobbers. What is the extent of the opportunities for placing appliances in our two million homes was the question we set out to find an answer to.

A letter of inquiry—a questionnaire—was sent out to every town and city in Canada where electric current is available. We have replies to date from something over two hundred and fifty of them—slightly more than one third of the total—and judge that an average of these returns is sufficient to enable us to form a good average estimate of the whole situation. The replies include towns and cities from the smallest to the largest populations and from all the provinces. It has been a great pleasure also to us to note the interest taken in our efforts by a very large number of electrical men who evidently gave us every assistance in their power.

Percentage of Houses Wired, 74.9.

The first question we asked was—what percentage of the houses in your constituency are wired? Various guesses at this figure have been made from time to time, but this is the first attempt, we believe, to gather actual data. The figures run all the way from 100 per cent. down to 20 per cent. It may be thought that the men who said 100 per cent. were too optimistic, and on the other hand that a figure of 20 was given by a rank pessimist. In averaging two hundred and fifty replies, however, these various characteristics have ample opportunity of offsetting and counter-balancing one another. The average figure actually worked out at 74.9 per cent.

It might be opportune to point out here that, in the

nature of things, these figures do not include farms or similar rural homes unless they lie close to a town. The electrical opportunities of the farm is a story by itself. There are approximately a million farm homes in Canada of which perhaps not more than twenty thousand, or two per cent., have a supply of electric current either from a central station or an isolated plant. The field for the small light and power plant is therefore practically untouched, to say nothing of the demand for small appliances that would thereby be created.

Three-quarter Million Prospects.

We revert, however, to our average of 75 per cent. for the city and town homes. Here again there are approximately one million. (This figure is based upon the recent government statement that the urban and rural populations of Canada are almost exactly the same). If 75 per cent. of these houses are wired, there are 750,000 houses wired—750,000 prospects for a complete outfit of electrical appliances—ranges, percolators, vacuum cleaners, washing machines, dish-washers, water heaters, toasters, air heaters, sewing machine motors, electric irons, ironing machines, electric refrigerators, electric fans, vibrators, etc., etc.

Let us see what an average of two hundred and fifty towns and cities tells us about the appliances already supplied to these homes:

Ranges.

The figures for ranges are, as would be expected, very low. The average is 3.1 per cent. There remains, therefore, 96.9 per cent. of 750,000—727,500 in actual number—* of electrical range prospects in the city and town homes of Canada. In many of these towns of course the rates are too high to make electric cooking look attractive, but the figures for the larger centres where current is cheap show no sign of saturation.

Percolators.

The percolator idea has never been sold to the people of Canada. Our neighbors to the south were always coffee drinkers, but in recent years we have acquired the habit to a greater extent. Every breakfast table should have a coffee percolator and yet the average is only 3.68—approximately 4 per cent.—only 30,000 percolators in Canada and a market for 720,000.

Vacuum Cleaners.

The vacuum cleaner has been more widely advertised, perhaps, than any other electrical appliance except the iron, but what do we find? Only 5 per cent. of the city and town homes have electric cleaners. Many of the reports showed less than 1 per cent. and only an occasional town ran as high as 20 per cent. This means that 712,500 homes in urban Canada are still waiting for these appliances as against 37,500 homes already supplied.

Washing Machines.

The charge has been made that there are too many kinds of washing machines on the market—no room for so many. Yet our figures show that a shade less than 6 per cent. of our town and city homes are supplied. A market is still

waiting for 705,000 machines as against 45,000 already sold, or roughly, fifteen to sell for every one sold to date.

Dishwashers.

Either dishwashers are no good or we have been very negligent in urging their value, for the percentage works out at .07. We cannot help the feeling that this figure is too low, but in any case it indicates great possibilities. This one item alone could keep an army of electrical dealers busy for some time to come. If the machines on the market do not do the work claimed for them there should be no secret made of the fact, and no effort spared to produce an article that will stand up to the requirements. Dealers carrying these machines are certainly losing money on them at this rate of sale. There is no more objectionable piece of drudgery in the home than washing dishes. An efficient machine would sell on sight.

Water Heaters.

This item works out at 1.3 per cent. There is some excuse in this case, possibly on account of the very considerable energy demand of an effective water heater. On this account the central station is inclined to discourage it, but, on the other hand it must be recognized as a good load leveler, inasmuch as, when used in combination with a furnace coil, as it generally is, the demand is low in winter and high in summer. The impression prevails generally, we believe, that these heaters are expensive to operate, but experience does not bear this out. Properly handled the water heater has the best year-round load-factor of all the household appliances and as a labor-saver and convenience it has all the necessary talking points.

Toasters.

Less than one-fifth of our houses have electric toasters, though everybody eats toast at least once a day. That is, more than eighty per cent. of the toast in cities and towns is still made with smelly gas or burnt fingers over a coal fire—and it doesn't taste half as good in either case.

Air Heaters.

Surely every home is a prospect for a small air heater. Our figures show, however, that slightly less than 5 per cent., 4.8 to be exact, of the homes have them. Here is a market, then, for something over 712,500 heaters.

Sewing Machine Motors.

1.2 per cent. There are few homes without a sewing machine, but there are 740,000 town and city housewives still pedalling their energy away on the old tread mill.

Ordinary Irons.

It is generally supposed that every home has an electric iron, but the figures compiled from our more than 259 questionnaires say slightly less than 46 per cent. Few retailers would try to justify such a situation as this. We know of several central station managers who send out an iron on trial with every new service and on the average less than five per cent. come back. Think of it—a field capable of saturation to 95 per cent. without sales effort, and yet not saturated to more than 46 per cent.

Ironing Machines.

This field is .14 per cent. saturated. Like the dishwashing machine, there is something wrong. Ironing, on the average, probably takes up about one-half day—sometimes a whole day—in six, leaving the housewife tired out and out of sorts. If a machine can be shown to save that labor and some of that time it will sell readily in twenty-five per cent. of our homes.

Electric Refrigerators.

There is no more logical appliance. It is useful every minute of every day in the year and aside from its initial cost adds practically no expense to the household budget.

Every architect should be sold on the idea of incorporating an electric refrigerator in every home of average dimensions. The degree of saturation at present is .06.

Electric Fans.

This is an all-the-year-round selling argument with only 5.4 of our homes provided. It is high time the general public should grasp the idea that a fan saves coal in winter by keeping the temperature uniform, just as it saves tempers in the summer by keeping the temperature down. The merits of electric fans have never been properly placed before the householders or there could not be over 700,000 homes in Canadian towns and cities without them.

Here briefly is the summary:—

Houses wired—74.9 per cent.

Degree of saturation of wired homes:—

Electric ranges—3.1 per cent.

Electric percolators—3.68 per cent.

Electric vacuum cleaners—5 per cent.

Electric washing machines—5.9 per cent.

Electric dishwashers—.07 per cent.

Electric water heaters—1.3 per cent.

Electric toasters—18.2 per cent.

Electric air heaters—4.8 per cent.

Sewing machine motors—1.2 per cent.

Electric irons—45.7 per cent.

Electric ironing machines—.14 per cent.

Electric refrigerators—.06 per cent.

Electric fans—5.4 per cent.

Taking an average of these percentages merely to crystallize our ideas, we find it works out to 7.3 per cent. This figure may easily mislead, however, as it will actually be much too high on a dollar and cents basis on account of the two items figuring most prominently—irons and toasters—being comparatively low priced. Even this leaves us a margin of 92.7 per cent. to work on however—the equivalent of about fourteen homes in fifteen that have never been touched.

It is interesting to see what this may actually mean in dollars and cents in the way of sales possibilities. Though we realize that big figures often mean nothing, it can do no harm to take an imaginary inventory. Let us suppose that every one of the three-quarters of a million homes is a prospect for each of the thirteen items listed above. This doesn't include lamps, fixtures, vibrators, grills and a dozen other things often found in the home, and so is not entirely unreasonable. What is each prospect worth: Range, \$150; percolator, \$15.00; vacuum cleaner, \$60.00; washing machine, \$150.00; dishwasher, \$300.00; water heater, \$50.00; toaster, \$10.00; air heater, \$15.00; sewing machine motor, \$25.00; iron, \$5.00; ironing machine, \$300.00; refrigerator, \$300.00; fan, \$20.00; total, \$1,265.00.

Now we all realize that this is something that can never happen. As an ideal, however, it is good enough to work to. Let us divide it by 10 to remove all objections and place it within the range of the year 1921. Thus we get as the demand of 750,000 urban homes 750,000 times \$126.5. That's 94,870,000 dollars. But of this, at the outside 7.3 per cent. is taken care of. Omitting this amount therefore we have as a sales possibility of the immediate future in the homes of our cities and towns (to say nothing of our rural districts) a grand total of about \$88,000,000.

This, we take it, answers the question—are we near the point of saturation in the sale of electrical appliances?

Having disposed of that question have we not also disposed of the suggestion that prices need to be lowered to stimulate demand? We think so. Demand will be created quickest and best by education.

How shall we go about it, you ask? We venture to make the suggestion that everything must not be blamed on

the poor consumer. He buys what he wants, in general. It is our duty to make him want electrical appliances. The best results can only follow when everybody in the industry works together. The onus of educating the public does not rest with the retailer alone nor with the manufacturer, central station or jobber alone. Up to the present time there is a marked lack of appreciation, in some cases, of reasonable obligations. The education of the public cannot be accomplished by any one class; it must be done by all working together—by each doing his share.

Another phase of the situation is the problem of getting the co-operation of the general contractor and of the architect. Both of these must be "sold" on the electrical idea—convinced that it is an essential in carrying out their own work properly. Much of the difficulty experienced in the

sale of appliances follows an indifference on the part of the architect and general contractor in providing for them. The electrical industry should thus set about getting the co-operation of the architect and contractor—set about it openly and actively, so as to clear away once and for all this very real obstacle to their progress.

Finally, let us all throw aside this fanciful idea that there is a depression in the electrical industry. There are many more signs of a boom than of a depression. The trouble is—we say it with all diffidence—that, fearing a depression, we have actually acted the part, and have accepted defeat just that much easier. Let us set out on our journey this 1921 with the conviction that times are "good," and the field unlimited. If we get that into our blood we shall easily make this year far and away the best in our history.

Furnace Efficiency Demands Continuous Gas Analysis

Controlling Combustion on Basis of CO₂ Alone, Unsatisfactory—Falls Far Short of Attaining Best Possible Results

Furnace efficiency should be considered separately from boiler efficiency, and the master key to the proper testing of furnace efficiency is continuous gas analysis, which not only measures the excess air present at all times, but **also promptly detects and measures the presence of combustible gases in the flue whenever they appear.**

When coal is burned in a boiler furnace under ordinary conditions, an average of about 65 per cent. of the heat generated is used to make steam, 25 per cent. goes up the chimney, and the balance is lost through radiation and in the ashes. How important it is to hold the chimney losses down to a minimum becomes evident when we consider that every decrease in chimney losses results in a proportionate saving of heat available for steam making.

To produce steam representing 1000 units of energy, it is necessary, on the 65 per cent. efficiency basis above described, to consume approximately 1,538 units of energy as it comes in the fuel. Now suppose the chimney losses are reduced from 25 per cent. to 15 per cent., which is not unusual, and that the 10 per cent. thus saved are turned into useful energy, making this 75 per cent. of that supplied in the fuel. Then, to produce 1,000 units of useful energy requires only 1,333 units of energy as supplied in the fuel. The difference between 1,538 and 1,333 is 205, and this is nearly 15½ per cent. of 1,333, the fuel actually required to carry the load under the more economical conditions. In other words, the saving in fuel represents 15½ per cent. of what is necessary under the more efficient operating conditions.

Chimney Losses and Their Relative Importance.

Heat is lost up the chimney in two distinct forms, namely, (1) the sensible heat of the entire volume of flue gases, and (2) the heat represented by the chemical energy in unconsumed combustible gases. The amount of the sensible heat is a function of the temperature and the volume of the flue gases. The amount of heat lost in the form of chemical energy is a function of the heat of combustion of the unconsumed combustible gasses and their volume. The loss of heat represented by a certain percentage of unburned combustible gases in the chimney is much greater than the loss of heat due to excess air represented by an equivalent percentage of CO₂.

To completely burn fuel, a surplus of air is always necessary over what would be theoretically correct. The amount of this surplus varies constantly, depending upon the many different factors that influence combustion. However, maximum efficiency under practical conditions is attained when there is just enough surplus air to make complete combustion possible, that is, combustion without the escape of combustible gases up the stack—it is that point where a reduction in the air supply results in incomplete combustion, and an increase in the air supply results in an unnecessary waste of energy through the carrying away of sensible heat by excess volumes of flue gases.

What CO₂, CO, CH₄ and H₂ in the Flue Gases Tell About Combustion.

Many power plant engineers do not place much confidence in CO₂ readings, and make it a general rule never to allow the CO₂ present to exceed 10 to 12 per cent. Others put it as low as 8 to 10 per cent. Under these conditions, there is likely to be a great waste of fuel due to the avoidable escape of sensible heat up the chimney. In contrast with these there are authorities who claim there is no danger of having combustible gases escape unconsumed before CO₂ reaches a point above 15 per cent.

The fact of the matter is, combustible gases may appear with any percentage of CO₂, and depending on CO₂ records alone is therefore decidedly misleading and illusory. It is quite possible to have large volumes of combustible gases, (CO₂, CH₄ and H₂) present simultaneously with a low percentage of CO₂ as well as a high percentage of CO₂. For example, if the fire in one part of the furnace is very thick or dirty, CO would be generated in that part and escape unburned because not enough air would be going through. If, at the same time, there is an air hole in another part, air would rush through there unused. Under these conditions CO would be found present at the same time that the record would indicate excess air by a low CO₂ reading.

The percentage of CO₂ for economical combustion may vary considerably from time to time in the same furnace with the rate of combustion, method of firing, thickness of the fire bed, distribution and character of the fuel, draft, formation of ashes, dirt and clinkers, and many other influences

which are subject to irregular variations, and which have a decided effect upon the completeness and efficiency of combustion with any given air.

Generally speaking, low CO_2 indicates excess air, but may also indicate that the air is poorly mixed, giving rise to a simultaneous formation of CO . It is therefore not desirable to attempt to secure a high percentage of CO_2 by cutting down the draft alone. A high percentage of CO_2 can be obtained with practically any draft, so long as it has the proper relation to the fuel bed resistance.

On the other hand, the losses due to the formation of combustible gases which are allowed to escape up the chimney without being burned are frequently much greater than the losses due to excess volumes of air, because it is quite possible to reach a very high percentage of CO_2 while simultaneously producing large volumes of combustible gases (CO , CH_4 and H_2).

Insufficient air supply is the most general cause of the presence of CO in the stack. CO may, however, be present due to the poor design of the furnaces, improper methods of firing, the coal being of a character not adapted to the equipment with which it is burned, poor mixing of the combustible gases with the air and low furnace temperature, which causes gases to be cooled below the ignition point before combustion is complete.

Occasional snap tests for CO with hand instruments to check up the CO_2 recorder have therefore proven entirely deficient in properly controlling combustion. Recording CO_2 alone has never, under any condition, given results even approaching the possibilities of economical combustion, and it is positively known that the maximum economy in fuel consumption cannot be realized by any of the old-fashioned methods.

Facts About Combustion in a Furnace Not Generally Recognized.

The oxygen used in the process of combustion in a furnace comes from two sources, namely, the primary and the secondary air supply. The primary air supply is that which flows through the combustible material in the fire bed. The secondary air supply is that which is admitted to the combustion chamber above the fire through holes in the fire bed, the fire doors, through leaks in the boiler settings, etc. It supplies the free oxygen necessary to oxidize the combustible gases generated in the fire bed.

The Bureau of Mines has conducted exhaustive experiments to determine what actually happens when coal is burned in a furnace. It was discovered with one fuel, that when the fuel bed is over 4 in. thick, and free from air holes, a furnace without secondary air acts very much like a gas producer. In a fuel bed 12 in. thick, where no secondary air was supplied, practically all the oxygen was consumed $4\frac{1}{2}$ in. from the bottom of the fire. At this point CO_2 reached 14 per cent. and combustible gases registered 10 per cent. About 26 per cent. of the gases leaving the top of the fire were combustible gases while the percentage of CO_2 was reduced to 7. Le Chatelier states that CO_2 generally reaches a maximum at a height in the fuel bed ten times the diameter of the coal pieces. From this point on reduction of CO_2 takes place.

The combustion of coal in an ordinary boiler furnace thus takes place in two stages. In the first stage, the fuel bed acts as a gas producer, producing CO and other combustible gases in large volumes. In the second stage these combustible gases are mixed with the secondary air and the carbon in the CO and other combustible gases is oxidized to CO_2 , and the hydrogen combines with oxygen to form water vapor.

Contrary to the generally prevailing impression, the volume of the secondary air required to burn coal in a fur-

nace is greater than the volume of the primary air. If the coal were all carbon the volume of the secondary air required under ideal conditions would be the same as the volume of primary air. In the first stage of combustion the reaction would be $2\text{C} + \text{O}_2 = 2\text{CO}$. In the second stage it would be $2\text{CO} + \text{O}_2 = 2\text{CO}_2$. In other words, the volume of air required to convert the carbon into CO in the primary stage is the same as the volume of air required to burn the CO into CO_2 in the secondary stage. However, there are other gases than CO which come off in the first stage of burning coal. To burn these additional gases, secondary air is required. Inefficient mixing of the combustible gases in the combustion chamber with the secondary air supply gives rise to still further demands for excess secondary air, that complete combustion may take place. How much secondary air is required depends on the furnace design, kind of stoker, method of firing, kind of fuel, etc.

Nobody can tell anything about the volume of the secondary air, where it all comes from, how much enters through the various known channels, or what its proportion to the total air supply is. It is generally recognized, however, that the one safe rule is to keep it at the least possible minimum necessary to insure complete combustion of combustible gases. This can only be done by a constant watch for the appearance of combustible gases in the flue, while holding the percentage of CO_2 at the maximum point which can be maintained without the appearance of such combustible gases.

Correct mixing of the air and the volatile combustible products of the furnace is a matter of greatest importance, and represents one of the most difficult problems of design the combustion engineer has to contend with in his efforts to cut down the amount of excess air necessary to insure complete combustion and to reduce the possibilities of having unconsumed combustible gases escape up the chimney. Stratification, having the process of mixing take place too slowly, or premature cooling of the mixture below the ignition point—all lead to waste.

How nearly combustion in practice can reach the ideal is well represented in certain boiler plants where blast furnace gas is the fuel. By means of a multiplicity of interspersed small air and gas orifices such a thorough, intimate mixture of the fuel and air is obtained that the percentage of excess air necessary to insure complete combustion has been practically reduced to zero. On the other hand, it is not at all uncommon to find in small coal burning boiler plants where hand firing is used, that the CO_2 in the flue gas analysis registers as low as 4 per cent., showing the presence of 420 per cent. excess air.

Essentials in the Attainment of Maximum Economy in Combustion Control

Only by continuously recording the percentage of CO_2 as an indicator of the amount of excess air present, and also detecting and clearly recording the presence of combustible gases (CO , CH_4 and H_2) immediately they are present, can effective combustion control be established. By no other means is it possible to avoid unnecessary loss at all times in the combustion of fuel, either due to an excess supply of air or through the loss of combustible gases up the chimney.

Graphic records of such a combination of simultaneous gas analysis, CO_2 analysis, and the various functions in boiler room operation, not only point the way toward improving combustion in a given furnace, but are also an indispensable guide when, to improve combustion, alterations or reconstruction of a furnace are considered. A furnace, like a boiler, is a mechanical device, and all its details, including mechanical draft, etc., all come under consideration.

Electric Arc, Thermit and Oxy-Acetylene Welding*

In the discussion to-day I will endeavor only to define the three distinct fields of welding which have been found best suited to the three important welding processes, namely, Electric Arc, Thermit and Oxy-acetylene Welding.

The advertising of some of the welding processes which appear in many technical journals is not only difficult to comprehend but in many cases confusing. I will not simply define the work in the different fields best suited for each process but will endeavor to present the possibilities and limitations of each process and will allow you to conclude for yourselves what the fields are because each field will over-lap to some degree, and the definition of the fields will follow logically from a consideration of the possibilities and the limitations of each process.

ELECTRIC WELDING

The principle of electric welding is simply breaking an electric circuit. The clamp which is held by the operator contains the electrode which is used for drawing an arc on the metal to be welded, and the heat of the arc melts small quantities of the end of the electrode which is precipitated into the weld.

Field.

Roughly, the field for electric welding is ferrous metals except cast iron, and to date the speaker has not seen any satisfactory welding in cast iron by the electric arc process, and I doubt if the efficiency of such a weld would be more than 50 per cent. However, this must be qualified, as certain jobs with cast iron by electric arc welding are successfully accomplished by the insertion of steel studs. The size of studs and the number varies with the size of the pieces to be welded and the resulting strength of the weld required. This class of weld is simply a matter of lacing from one steel stud to the next and the adhesion of the added material to the cast iron itself is not counted upon. This is the method employed in the case of electric arc welding on locomotive cylinders which has been found satisfactory, for certain types of repairs.

Temperature.

The temperature of the electric arc is approximately 7000 deg. F. The entire heating of the electric arc is applied directly to the metal being welded which is accountable to a degree for the low efficiency of an electric arc weld as compared to other processes.

Efficiency.

The efficiency of electric arc welding on favorable classes of steel with skilled operators and a good direct current welding machine is from 75 per cent. to 85 per cent. This efficiency, while sufficiently high in the case of certain classes of work, when compared with the results of welding similar metals by the oxy-acetylene process is considerably lower. It is possible to make an oxy-acetylene weld 90 to 95 per cent. efficient.

Advantages.

The advantages of electric welding are, first, the speed; secondly, the comparatively low current consumed, and thirdly, the absence of the factors of expansion and contraction.

Summary.

Briefly, the field for electric welding is steel, particularly sheet steel such as boiler plates, and in this case the triple

riveted joint of a boiler is approximately 85 per cent. efficient. Therefore, the possible weld with the electric arc is sufficiently high and the advantage of absence of expansion and contraction results in the electric arc process being used largely on this class of work.

Machines.

The two important types of electric machines are the alternating and direct current machines. The alternating machine is a form of transformation and has been found suitable for certain classes of welding, but the difficulty of current fluctuations in the source of supply of current must be contended with.

The direct current machine is a form of motor generator set and the standard machines are supplied wound for the stepping down of the usual line voltages of 110 to 550 volts. The standard direct current welding machine running idle generates from 60 to 75 volts and when the arc is struck this voltage is reduced from 18 to 25 volts, depending upon the length of arc used. The current consumption is approximately 100 to 125 amperes.

THERMIT WELDING.

The principles involved in Thermit welding are similar to those employed in every day foundry practice. The two pieces of metal to be welded are jigged so that they will take their proper relative position after the crack is filled with Thermit compound with precautions taken against any resulting effects of expansion and contraction. The crack to be filled with Thermit compound is filled in with paraffin wax. Around the weld is built a sand mold with the necessary pre-heating, ventilating and pouring gates provided for. The flame from a gasoline torch is applied through the pre-heating gate which burns out the paraffin wax, and continues until the necessary pre-heating is completed.

The Thermit compound is similar to sand in appearance. The composition of the Thermit compound is a secret compound and when ignited shows a similar chemical re-action to gun-powder. The time element in this chemical re-action is a fraction of one second. The Thermit compound is contained in a conical tank lined with fire clay and upon being ignited the compound takes the form of molten metal and the seal at the bottom of the Thermit container is broken and the molten Thermit compound runs into the pouring gates and the practice from this point is similar to the standard foundry practice.

Field.

Briefly, the field for Thermit welding is heavy welding, say, for sections greater than 20 sq. ins. and ferrous metals, including cast iron, and is used to great extent on such jobs as locomotive frames, heavy machine bases, wobblers in steel rolling mills and large shafts. The Thermit welding requires a mold in every case excepting where special metal molds are provided for repetitive work and the average cost of a Thermit weld does not make Thermit welding profitable for smaller sections.

OXY-ACETYLENE

In order to cover the advantages of oxy-acetylene welding it will be necessary to give a brief description of the welding torch and its operation.

All makes of oxy-acetylene welding torches allow for the entrance of acetylene in one tube and oxygen in another

*By W. H. Ludington of the Davis-Bournonville Co., at the weekly luncheon of the Montreal Electrical Club on January 12, 1921.

tube and these two gases are mixed either in the handle or in the tips. The tips are fitted into the head of the torch, and the welding tip consists, in addition to the mixing chamber in some makes of torches, of a bore down the centre of the tip, at the point of the tips where the oxy-acetylene flame burns. The hot part of the oxy-acetylene consists of the smaller bead flame varying from the size of a grain of rice to $\frac{1}{2}$ " or slightly more in length. The content of acetylene gas is carbon and hydrogen, the chemical formula being C_2H_2 .

The composition of acetylene flame, briefly, is the oxidation of the carbon of the acetylene with the pure oxygen supplied through the torch, and hydrogen is given off which burns with a large blue envelope flame. The advantage of this large blue envelope flame is that it is from 5 to 10 inches in length and can be used to a degree for pre-heating and always serves as a protection to the metals in the molten state from the oxidization action of the atmospheric oxygen. This is one feature peculiar to oxy-acetylene welding which makes it superior to other processes of welding.

Also the sources of heat obtained by the oxy-acetylene flame can be manipulated in a convenient form, the flame is not necessarily directed on the metal and the flame can be held at any required distance from the work depending upon the heat required for welding the metal in hand.

Field

Briefly, the field for oxy-acetylene welding process is all metals, ferrous and non-ferrous, and with the exception of the class of work which can be done more cheaply by one of the other two processes with the results of the other process being sufficient the oxy-acetylene welding process is used entirely.

Oxy-Acetylene Cutting

Oxy-acetylene cutting possibly constitutes a larger field in the industry than does the welding, and the feature of cutting with the oxy-acetylene cutting torch is not found in any degree in the other process. The oxy-acetylene cutting torch, hand equipment and automatic equipment is revolutionizing generally machine shop practice. The cut made with the automatic oxy-acetylene cutting machines is equal to any roughing tool finish, and the carbon content of the metal cut is not affected by the heat presence of the oxygen jet to any appreciable degree. Any deleterious effect is confined to a film of scale which forms on the faces of the cut which can be readily removed in most cases by the thumb nail, and in all cases by a few rubs of a file.

The oxy-acetylene cutting industry has created a tremendous market for oxygen and the demand for oxygen has resulted in the development of the necessary equipment for the manufacture of oxygen electrolytically from water. The purity of electrolytic oxygen is approximately 99½% and the impurity present is hydrogen which is of assistance in burning the metal. The principal of oxy-acetylene cutting is simply combustion.

SUMMARY IN GENERAL APPLYING TO ALL PROCESSES

Every weld is simply cast metal and as far as possible adding material should approximate the metallurgical analysis of the parent metals being welded, malleable iron is simply cast iron puggled. To weld malleable iron the heat required to melt the metal converts the malleable iron back to cast iron and the method used to join malleable iron without robbing the metal of its ductility is to braze. The heat necessary for brazing is not high enough to convert malleable iron, and the principle of a braze is simply cementing. However, brazing should always be done by an experienced operator as in a braze the adding material which is used as a cement must penetrate the entire joint, and it can not

be determined whether this has been accomplished until the metal breaks.

The development of each of the three processes covered by my talk today has been phenomenal and I would not attempt to give the possibilities of future development because each day by the introduction of ingenuity, jobs are being done which six months ago were considered impossible. Therefore, I would ask you to keep an open mind and encourage the industry by affording every opportunity for us to show what we can do. In other words do not refuse to undertake a job because some demonstrator did not accomplish the same job six months previous, because the possibility is that the same demonstrator could return to your plant and do the same job successfully on which he fell down six months previous.

The Resources of Canada

Mr. C. Price Green, Commissioner of the Industrial and Resources Department of the Canadian National Railways, gave a most interesting address before The Electric Club of Toronto, on January 14th. Mr. Price Green has travelled widely, and has made it his particular business to study and tabulate the resources of this country, and his array of opportunities certainly did not leave the members of the Electric Club ashamed of being citizens of this great Dominion. He elaborated on the mineral wealth, the coal resources, the pulp limits, the forests, the agricultural possibilities, and finally the people themselves, pointing out that in no case have we over-estimated or are we likely to over-estimate the resources of our country if they are properly developed and conserved.

More publicity of this nature would be a good thing not only for Canadians themselves but for the rest of the world. Mr. Price Green is an optimist, but he bases his optimism on intimate practical and technical knowledge. It is safe to say he left his hearers in the same mood—very much delighted, very much pleased and very much encouraged at the outlook for the future.

Mr. George D. Perry, president Canadian National Telegraphs, presided.

Improving Victoria's Street Lighting

The system of street lighting which has for many years illuminated the streets of Victoria, British Columbia, is being displaced. In that part of the city known as Victoria West, installation of nitrogen fixtures is proceeding rapidly. The city electrician, Mr. M. Hutchison, had recommended the change, but had been unable to complete the changes owing to the non-delivery of the necessary equipment. Mr. Hutchison is hesitant about advocating further changes and extending the system, as he declares there seems to be a complete disorganization in the production of electrical supplies. He said: "During 1920 delivery of essential supplies was very slow and erratic, and prices made rapid and large fluctuations without apparent reason."

The street lighting system of Victoria consists of 905 arc lamps and 1,000 five-light cluster standards. The lamps are served with power by means of a system of overhead lines aggregating 250 miles in length. The city is divided into nineteen separate lighting districts, each supplied with independent power circuits. The cluster light system supplies the central portion of Victoria and is supplied with power by means of an underground cable system.

During 1920 the arc lighting part of the system had operated 3,750 hours. The cost of the power consumed was \$14,884. Cluster lights were operated 3,800 hours at a power cost of \$4,979. The latter system is operated as a local improvement and all maintenance charges except those for a direct tax against the property



Electric Railways

Two-Car Three-Truck Trains*

This Combination Being Tried Out in Milwaukee with Much Success. One Conductor Handles Both Cars

For a number of years electric-railways have found it very difficult to obtain capital for new construction. Managements faced with the necessity of effecting every operating economy possible without a reduction in the quantity of service, and unable to spend money for new equipment, even though operating economies would certainly result, have found this necessity truly the mother of invention. The problems to be solved were: (1) To run more service through sections already congested to apparent capacity; (2) to do this with fewer trainmen; (3) to do this with smaller expenditures for power and for maintenance of tracks and cars; that is, to reduce the car weight per unit of capacity; (4) and finally, and this is controlling, to do the job without spending any money.

This problem had to be faced in 1917 to 1920, when equipment prices were advancing from twice to three times the values obtaining at any time in forty years. The problem, of course, has not been completely solved. Various attempts have been made with varying results. Perhaps a brief review of the experiments made over the course of several years in Milwaukee will be of interest.

The Milwaukee system is a combined urban and inter-urban property. In the operation of its interurban system the company has for many years operated interurban cars in trains, always, however, concentrating the power in one unit and employing two, three and even four plain trailers for the remaining units in each train.

In 1912, incident to a general plan of revamping and modernizing its old urban equipment, advantage was taken of the opportunity to regroup the motors on certain cars, making such cars capable of pulling trailers and at the same time avoiding the necessity for purchasing as much motor equipment as would have been necessary had all cars been re-equipped with motors. The experience on the interurban system naturally suggested that, in constructing trains, the second car should be a plain trailer and be pulled behind a suitable motor. During the years 1912 and 1913 all but seventy-two of the company's older types of cars were thoroughly overhauled and re-equipped, and fifty-four of these cars were stripped of motors, controllers, trolleys, etc., and arranged with detachable couplers and suitable light wiring and air connection, to permit them to be operated as trailers. As the system and all of the single-car units were arranged for double-end operation, it was necessary to make certain special track arrangements for the operation of these single-end trains around loops. These loops were generally placed some distance short of the ends of the lines upon which the trains were scheduled, resulting in short-route operation of the two-car trains.

Experience with these fifty-four trains developed, of course, some economy in platform labor, but cost of loops

and the lack of flexibility of the single-end trains, both on the system and in the car stations, deterred the management from extending train operation for some time thereafter. In the light of more recent experience it is difficult to understand why the cars were entirely stripped of motors and power wiring, controllers and trolleys and a less convenient and more expensive method of operation chosen. It would have been somewhat cheaper to arrange these same cars for double-end operation in two-car trains, thus making them available for use anywhere on the system with equal flexibility with the single-car units.

No further progress was made in the development of train operation in Milwaukee until about 1916, when the company undertook to build in its own shops fifty new cars of the centre-entrance and exit and front-end exit type. Three cars were equipped with two motors, maximum-traction trucks and multiple-unit control, with a view of operating in two or three-car trains. In choosing these cars the advantage of double-end operation of the trains was recognized, although considerable additional expense was incurred in arranging the cars for both single-unit operation and train operation, which might have been saved by arranging them for train operation only. These cars operated in trains afforded further economy in the use of labor. The last of these cars were placed in service at the beginning of the year 1918.

The demonstrated advantages of double-end train operation, of course, suggested the idea of coupling up existing equipment where possible to achieve further economy in the use of platform labor. The company had a certain number of old cars more or less modernized which were equipped with two motors each. The controllers, standard on the property, are readily capable of handling four motors. The next development involved merely putting pairs of these cars together with permanent coupling, rearranging the wiring and carrying it through on the permanent coupling bar, stripping each car of one trolley and one set of air and electric controls and removing one air compressor. Cars so put together operated perfectly as double-end and two-car trains.

While this development was going on, war conditions were rapidly advancing the cost of labor and material and platform labor was becoming extremely scarce, even though wages were rapidly advanced. Seventy-two of the oldest cars owned by the company and which had been excluded from the original programme of reconstruction and modernizing had by this time become sorely in need of general overhauling if they were to be kept longer in service. Under ordinary circumstances it is probable that these cars, on account of their extreme age, would have been scheduled for retirement from service. Under war conditions this treatment was of course out of the question. The problem presented was how to treat these cars, incident to the necessary repair and reconstruction, so as to derive the maximum benefit from the expenditure. It was reasoned that if double-end, two-car trains operated by three men were advantageous, as compared with single-unit operation with two men per car, a two-car train arranged to be handled by one conductor would be even more advantageous. This point was emphasized by two considerations, namely: (1) Scarcity

*Abstract of paper read before joint meeting of A. I. E. E. and W. S. E., Chicago, December 17, 1920.



One of Milwaukee's Two-car, Three-truck, Two-man Trains.

and high cost of platform labor; (2) difficulty of making tripper runs attractive to men without payment of excessive bonus time.

Construction of the Three-truck Train.

To handle a two-car train with one conductor in city service requires, of course, that the passengers be allowed to pass freely from one car to the other while the cars are in motion and rounding curves, etc. This requires the careful articulation of the cars and the elimination of all possible motion and displacement of the two car bodies at the point of connection. It also requires the location of the conductor at a point to control the admission of all passengers and the exit of all passengers from the rear car. This became virtually the same problem as that of the location of the conductor in a large centre-entrance car. All of these requirements pointed to the connection of the two cars with minimum amount of space at the adjacent platforms and the support at that point of a single truck.

In adapting these old cars to these conditions it was necessary to support the old car bodies in substantially the same manner as they had been previously carried upon individual trucks, namely, at the car body bolsters. This was accomplished by placing under each car an auxiliary steel underframe beginning at the outer truck bolster and continuing through to the point of joining the two car bodies together. By suitable design, this steel underframe carries the weight of the car at the old car bolster, provides adequate support for a greatly enlarged platform and transmits the load to the centre truck, where a kind of ball and socket joint arrangement on the ends of the two main auxiliary girders permits both to rest and pivot on the centre-truck kingpin and bolster.

The enlarged platforms were desired in order to provide space for the larger number of passengers to be handled and to accommodate the heating equipment. The platforms were connected by overlapping steel plates attached to the platforms, and arranged to permit the necessary joint movements on curves. The vestibules were connected by diaphragm. The motors of the cars were regrouped on the outer trucks, giving the train the same motor power as cars possessed

when individually operated, and, accordingly, the same speed and power when arranged as a train.

In the actual reconstruction of these old cars into three-truck trains it was found possible to increase the combined seating capacity from 84 to 106 in summer and from 80 to 102 in winter, and the standing capacity an even greater percentage. The old car bodies were greatly strengthened by the use of the steel underframes. There were recovered from each pair of cars two trolleys, two sets of air and electric control, one air compressor, two standard trucks, besides various minor equipment, such as destination signs and headlights. And notwithstanding the addition of the third truck, new steel underframes and enlarged platforms, the total weight of the finished train is only slightly more than the combined weight of the individual cars.

On account of the exposure of the centre truck, particularly on curves, it was found desirable to reduce the lateral dimensions of the truck and necessary clearance to a minimum. This was accomplished by building a special truck having inside journal boxes.

Advantages and Disadvantages of the Three-truck Train.

Experience has shown that these three-truck units have the following advantages:

1. Utilization of old obsolete equipment in a manner making it entirely acceptable for rush-hour service and for other special service, as well as for regular service on very heavy lines where the traffic justifies the operation of units of this size.

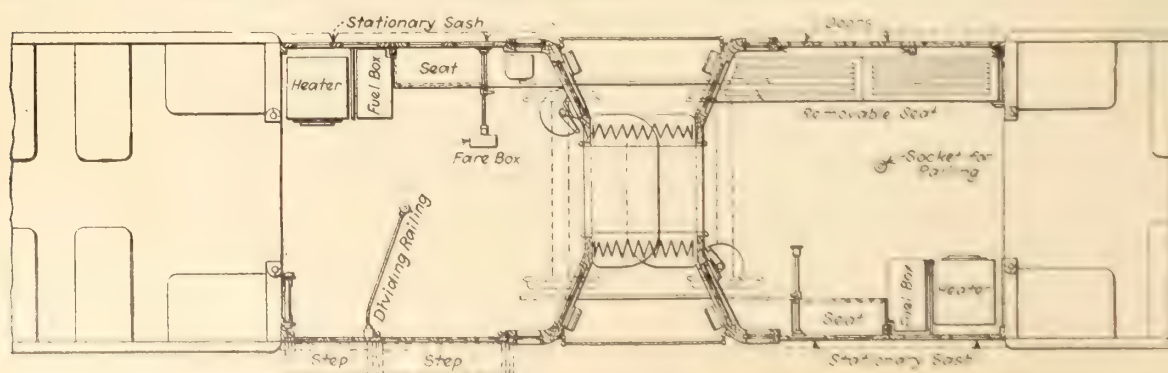
2. Economy in platform labor.

3. Adaptability for operation as either straight pay-as-you-enter or as a combination pay-enter and pay-leave system.

4. Better control in distribution of passenger load.

The disadvantages of these units are:

1. Difficulty of locating the trolley stand so as to be accessible to the conductor and yet avoid frequent leaving the wire on curves. Where electric switches are not operated, the preferable location of the trolley is over the rear truck. On a system operating single-car units and electric switches it is necessary to employ a special swiveling trolley



which in practice follows the wire substantially as well as the standard trolley mounted over the car truck. It requires, however, to be equipped with two ropes in order to handle it around the diaphragm connection between the cars.

2. Slowness in loading, as compared with single-car units. The same objection, however, would apply to increasing the size of single cars. In Milwaukee operation this disadvantage is of no moment, as street fare collectors are employed at all congested corners to facilitate operation of all types of trains and single-car units during the rush hour.

In the particular case of reconstructed old cars into three-car trains these general results were achieved:

1. The winter seating capacity was increased from 40 per car to 102 per train, or 27.5 per cent.

2. The weight per seated passenger was reduced from 913 lb. to 735 lb., or 19.4 per cent.

3. Rush-hour capacity (as determined by standards of the Wisconsin Railroad Commission) per trainman increased from 30 passengers before reconstruction to 76 passengers, or 153 per cent.

4. Rush-hour capacity per trainman increased 31 per cent., as compared with largest two-car, three-man trains operating at same service standard with fifty-eight passengers per man.

5. Power consumption per passenger under rush-hour capacity reduced 26.6 per cent., as compared with the same cars operated singly before reconstruction.

6. The net cost of providing the increased rush-hour capacity did not exceed \$72 per passenger, or less than one-half the cost per passenger of purchasing the cheapest character of new equipment.

In general the train has proved satisfactory in operating characteristics. Thirty-three of these trains are now in service, the first one having been operated fourteen months. The passengers accepted the trains without comment or notice. They have attracted no special attention from the local public or the press. The trains keep their place on the road and do not get behind schedule to as great an extent as three-man cars.

With three-man trains the passengers show a preference for the first car in the ratio of about eight to five. With the three-truck train there appears to be no preference shown, but this may in part be accounted for by the fact that the conductor has an opportunity to control the distribution of the load.

The gross cost of converting the old cars into three-truck trains, including thorough overhauling and repair of old bodies and trucks and enclosing the old semi-open platforms, averaged about \$3,000 per pair. The conservative value of the equipment recovered is more than \$900. The net cost of converting these very old and obsolete and rather small cars into attractive trains which are economical and satisfactory for operation for many years to come is returned through direct saving in platform labor alone in less than one year.

No careful study has been made to disclose the further economies which might be achieved in constructing three-truck trains entirely from new materials. It is certain, however, that substantial gains would be possible in respect to weight, power consumption and first cost as compared with providing the same capacity in single cars or in two-car trains of the multiple-unit type. The cost of a three-truck train should not exceed the cost of a motor car and trailer

of equivalent carrying capacity but requiring three men to operate.

General Conclusions.

Experience in train operation on surface lines leads to the following general conclusions:

1. A comparatively large number of trains may be operated advantageously on any fairly large urban system. The

Total cars owned	600
Total cars scheduled maximum rush hour....	566
Total cars scheduled maximum non-rush hour	254
Total single cars	336
Total cars in trains	264
Single cars for shop	24
Single cars for regular inspection and washing	58
Single cars available for rush hour	312
Cars in trains for shop	10
Cars in trains available for rush hour	254
Ratio cars in trains to total cars	44 per cent
Ratio cars in trains to single cars	78.6 per cent
Ratio cars in trains to rush-hour trippers	81.4 per cent

maximum number that may be so operated depends on local conditions, but in general may be taken as being equal to at least 80 per cent. of the rush-hour trippers. From a traffic standpoint it would be possible to operate 100 per cent. of the trippers in trains. Extra single cars for scheduled inspections and washing, but available for rush-hour service, accounts for the lower percentage of trippers in trains which can be operated in practice. Figures from the Milwaukee system, given above, will illustrate the point.

2. Trains load somewhat slower than single cars, but this disadvantage is largely overcome by using street fare collectors. Whatever disadvantages exist are small in comparison with the advantages derived from economy in platform labor and track space.

3. Cars in trains are economical and satisfactory for many classes of special service such as baseball, theatre crowds, picnics and the like. In such cases loading and unloading time is relatively unimportant, particularly where cars are standing between going and returning loads.

4. In rush-hour and special service the distortion in headway is not important as cars run close together in any event.

5. The use of a substantial percentage of the total equipment in trains assists greatly in working out good runs for the men, also in reducing the number of extra men and payroll time not worked. The more rigid the agreement or rules under which the men work respecting percentage of straight runs, limits on spread of duty and extra time for overtime the more advantageous train operation becomes from the labor standpoint.

6. It is practicable to operate an unpowered unit of a train either ahead or behind the motor car. The control is easily carried through and the train operates as well in one direction as the other. This is of importance mainly on systems which operate double-end. Double-end trains are, of course, easier to handle in car stations and admit of short routing without loops.

7. It is not desirable or necessary to couple and uncouple trains daily or even frequently. Automatic air and electric couplers are expensive and any other kind involve serious hazards in operation. Couplers must swing through a long arc and even if automatic, as far as making connections is concerned, they must be handled with extreme care if frequent injuries to hostlers and other employees are to be

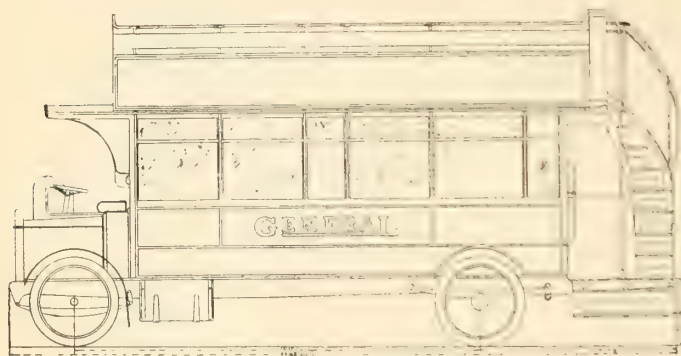
avoided. About the only excuse for the use of readily detachable couplers is to enable one car of a train to continue in service if the other is disabled. A non-detachable coupling greatly simplifies and cheapens the making of trains from single units.

8. It is important to use folding steps and platform-inclosing doors in train operation in the interest of avoiding accidents to passengers who attempt to board or leave the leading car while in motion.

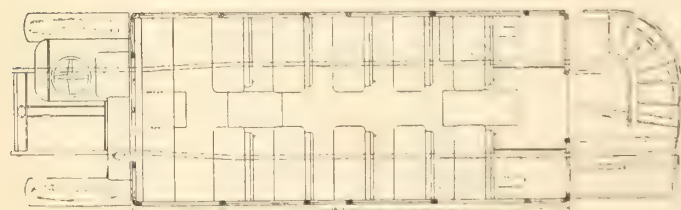
London Experiments With New Omnibus

New Vehicles Will Test Economy of Operation and Fare Collection

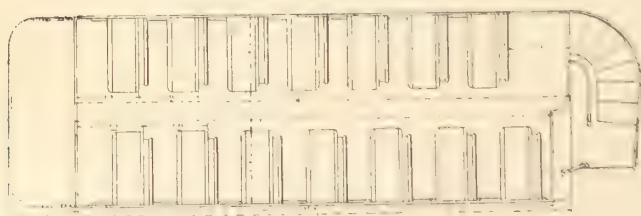
The new S model of the London General Omnibus Company is another evidence of the ingenuity of private enterprise in finding solutions of problems that are agitating passenger transport circles in England. For some time past the high cost of labor, combined with the extra expense of fuel have served to render the London omnibus service unprofitable, although the recent increase in fares may help to overcome the deficiency in revenues. It is believed that the S machine will do much towards reducing congestion, for its increased seating capacity enables two of the new vehicles to carry as many passengers as three of the B class. This enlarged capacity should alone have an effect upon working costs. Contrasted with the K type, the new vehicle has eleven extra seats. Externally, the S omnibus resembles in length of body and general appearance the omnibuses to be seen on Fifth Avenue, New York. Its



Side Elevation of the S Type Omnibus



Plan of Inside Seating giving accommodation for 20 Passengers



The Top Deck with Seats for 28 Passengers

New London Bus Seating 57 Passengers.

increased seating capacity has involved an addition to its weight, but not to an excessive extent. Moreover, it provides more comfortable riding, owing to improved springing. By removing the schedule of fares from its old position in the centre of the space at the rear of the driver it has been possible to place seating capacity here for five persons instead of four, as on the old arrangement.

The S is an ingenious development of the K vehicle. The great gain in seating is achieved with a comparatively small increase of unloaded weight and with a notably slight increase of road occupation. The overall length is 24 ft. 7 ins., the body being only 2 ft. 2¼ ins. longer than that of the K type. The extra length of the body allows for a narrow additional side-window, between two centre pillars which give added strength to the body where required. The space between these pillars provides a convenient position over the side-glass for another new feature—an illuminated service number. The front framing of the body has also an extra pillar which gives extra strength for the additional load carried on the top deck. The top deck seats are carried back as far as possible to lighten the roof load on the front axle.

Taken in conjunction with the fact that passenger traffic in inner London is mainly for short distances, besides being heavy in volume, the increased seating renders the vehicle a test of the system of fare collection as well as an experiment in economy of operation.

London's Queue Problem

The Tramway and Railway World states that a member of the London County Council is strongly advocating the institution of queues for London to obviate the daily scramble for tramcars and omnibuses. At a recent meeting of the council the following resolutions were passed:—

(1) That it be referred to the Highways Committee to consider and report whether more shelters can be provided and queues organized at busy tramway stopping places such as at Victoria; (2) that it be referred to the Local Government Records and Museums Committee to consider and report whether representation should not be made to the Commissioner of Police of the Metropolis and the Minister of Transport as to the necessity of framing a by-law providing for the formation and regulation of queues at all stopping places, whether for tramcars or omnibuses.

Fewer Receiverships in 1920

According to figures recently made public sixteen electric railway companies in the United States went into receivership during 1920, against forty-eight in 1919 and twenty-nine in 1918. The 1920 record in this respect was the best in twelve years, with three exceptions. The sixteen properties represented 267 miles of track, \$6,231,150 of stock and \$5,971,578 of bonds. One authority on railway matters ascribes the improvement in the year to two causes (1) generally good business conditions, producing larger patronage of roads, and (2) generally higher fares. The situation, however, is considered only moderately satisfactory, and it is admitted that some companies are running so close to the bankruptcy line that it is a question whether they will survive the business depression the country as a whole is now experiencing.

In the course of a recent address, Mr. Roger W. Babson, head of the Babson Statistical Bureau of Wellesley, Mass., said "If I were a young man starting as a salesman to-day, I would enter the electrical-appliance-selling end, selling clothes-washers, vacuum-cleaners, irons, etc., to make for efficiency in the home."

The Electrical Contractor

Curve of Overhead Expenses

Attention Again Drawn to the Valuable Work of the Chicago Estimators' Association

About two years ago the results of investigations of the Electrical Estimators' Association of Chicago were made public, and on January 15th, 1919, we published in the Electrical News a resume of a report published by this association. From time to time we have been advised by various contractors that the curve had been of unusual value to them, and that they had been guided by it in making their estimates. At a discussion among Montreal contractors a few days ago on the subject of overhead, the curve was again referred to and the wish expressed that the information may be published again. Under the circumstances we have pleasure in reproducing the cut and part of the explanation that accompanied it. The curve shows the overhead percentage on jobs varying from \$1,000 to \$15,000.

In this curve the overhead is expressed as a percentage of the cost of installation and not of the volume of sales. The extension of the curve beyond \$15,000 gives the following percentages: \$20,000, 13 per cent.; \$30,000, 11.5 per cent.; \$40,000, 10.75 per cent.; \$50,000, 10.5 per cent.; \$60,000, 10 per cent.; \$100,000, 9 per cent.; \$160,000 and up, 8.5 per cent. In the curve, a \$200 job runs 52 per cent.; a \$300 job, 42 per cent.; a \$1,000 job, 36 per cent.; and so on. Extracts from the report follow:

The first question to present itself to your committee was: What is "overhead?" Several descriptions were given. One described it as the ratio of the annual cost of doing business to the total volume of sales; another, the ratio of the annual cost of doing business to the volume of sales less the profit; and still another, the ratio of the annual cost of doing business to the cost of labor and material installed during the year.

Working with any of these descriptions gives only average percentage and therefore not the correct percentage of overhead to be added to the estimated cost of any particular installation, and that's the thing we're after.

In all discussions of overhead, either written or oral, with which I am familiar, the statement is made that overhead determined in accordance with one of the foregoing descriptions for any year cannot always be safely applied for the next year, as the volume of business may change and other conditions vary. This is at once an admission that the overhead percentage so determined is of little value.

You also hear it stated that the overhead of contractors doing a large volume of business is less than that of a small contractor. This is true, but not the whole truth. Any large contractor who thinks his overhead on a small job is less than the small contractor's is fooling himself. The real reason for the large volume of business being carried on with a lower overhead is due to other causes than the volume. I will endeavor to make this clear later.

The committee finally decided to accept the cost of installation as the base for expressing overhead.

A suggestion had been adopted that a curve of over-

head percentages be plotted and it became necessary to decide what this curve should represent. The original suggestion was to plot percentages in relation to the annual volume of business. This was at variance with the decision to use cost of installation as the base for expressing overhead. The point was raised that a curve using installation cost would give only average results and therefore would not give the proper percentage to be applied to any particular estimate as installations of different costs carried entirely different percentages of overhead. This immediately started something and actual experiences were given showing that this point was well taken.

An example is as follows: The John Jones Company calls up for an estimate on alterations and additions to wiring in its building. An estimator is sent and requires an hour or more to reach the location, waits fifteen minutes or so to see the proper party, spends an hour going over work, returns to office, makes up installation cost as approximately \$1,000. Estimator's time one day. What overhead should be added—the average? A contractor doing so and closing the contract will be losing money on that particular job unless the average estimated cost of installation of his jobs is \$1,000 or less.

How many \$500 and \$1,000 jobs does a contractor figure on and how many of these does he close? A ratio of 10 per cent. is probably high. The overhead for any particular cost estimate must include as nearly as possible the expense of estimating similar work which was not closed.

Let us follow this job after it is closed by a contractor who has added 20 per cent. to his labor and material cost for overhead and 15 per cent. to this net cost for profit; result, \$1,380, a total of 38 per cent. above estimated cost. The contractor has been fortunate, only estimating nine other similar jobs not closed. Each has had an estimating cost averaging not less than \$10, probably more. Fifty per cent. of the overhead is gone and the job only closed. Overhead has been working unobserved. It now gets busy in the open. Its first demand is a job ticket and this costs at least as much for a \$1,400 job as for a \$10,000 one, and probably more as there are no plans and specifications and the ticket must give an accurate description of the work. The mechanic is then made familiar with the work by either coming to the office or meeting the estimator or superintendent at the job.

The material list is made up and orders sent out. The time and material cost for these items is much greater in proportion for the \$1,400 job than for the \$10,000 one. And so on along the line for superintending, bookkeeping, and all other items entering into overhead expense. When the work is completed, the overhead has been nearer 40 per cent. than 20 per cent. and all or part of the expected profit goes to overhead. The contractor does not know this as he has not separated his overhead for this particular job. At the end of the year, however, he realizes that his profits are not as great as he expected from what he considered liberal percentages added for overhead and profit on his smaller work.

After several stories similar to the foregoing and many discussions, a curve was developed by using a few points obtained from actual data given by members of the com-

mittee From this curve I will endeavor to explain why these results are more nearly correct than the average percentages usually obtained.

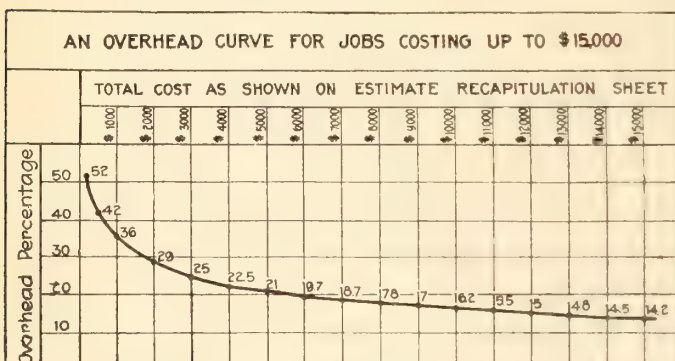
The curve is drawn in two parts. The more important part is drawn with the large divisions representing \$1,000, while in the other portion they show as \$10,000.

Always bear in mind that the dollars cost shown represent the estimate sheet cost and that the overhead percentage is applied directly to this cost.

By estimate sheet cost, or installation cost, is not meant simply the estimated cost of labor and material, but also includes all items directly chargeable to the job, such as bond, if any, liability insurance, drawings, inspection, freight, railroad fares, board, etc.

The curve starts at \$200 with 52 per cent., falls rapidly to 42 per cent. at \$500, 36 per cent. at \$1,000, 29 per cent. at \$2,000, 25 per cent. at \$3,000 and is now falling more gradually to 21 per cent. at \$5,000, 16.2 per cent. at \$10,000, and 14.25 per cent. at \$15,000. In the other curve we find a still more gradual decline to 13 per cent. at \$20,000, 10 per cent. at \$60,000, 9 per cent. at \$100,000, finally reaching 8.5 per cent. at \$160,000, and thereafter the curve is practically horizontal at 8.5 per cent.

The small contractor doing an annual business of \$20,000 to \$40,000 will find his job costs falling on the curve from \$200 to \$5,000, with the larger proportion near \$1,000 or less. From \$50,000 to \$100,000 the job costs will fall around \$2,000



to \$5,000. The large contractor doing \$250,000 to \$500,000 will find his jobs on the flatter portion of the curve from \$10,000 up.

From this it appears that the lower overhead of the larger contractor is due not to the fact that the volume of business is greater, but to the lower percentage of overhead which the larger contracts carry.

Irrespective of the yearly volume of business, each estimated job should be apportioned its proper overhead percentage, as determined by its size, instead of an average percentage obtained from the annual cost of conducting the business and the volume of business.

In using a curve of this character it is easy to check at the end of the year whether the overhead percentages are correct or not, by tabulating the cost of all jobs and applying to each the proper percentage of overhead according to its size. The total should approximate the amount the books show as the cost of running the business.

Let us now turn to the application of the curve where the volume of business increases or decreases. If the volume decreases materially it is usually due to fewer of the large jobs and a portion of this may even be offset by more small ones. As the small jobs carry the larger overhead, it is readily seen that the overhead tends automatically to adjust itself where an average percentage would not. This also applies to an increase in volume, the increase being usually due to more of the larger jobs.

With this system of applying overhead it is evident

that the large contractor bidding on the small work in competition with the small contractors should use practically the same percentages and in so doing, if he obtains the work, not rob the larger jobs of profit to pay overhead on the small ones.

Too Much Variation in Bids

In a given territory, it may be said without the fear of successful contradiction, that the differences in estimated cost of a certain definite installation will not vary more than five to eight per cent. Yet bids are submitted that vary from fifty to seventy-five and even eighty per cent. Often the job is awarded to the contractor whose figure is fifteen to thirty per cent. lower than the average cost of the competing firms.

Such a condition, and the above is no wild flight of the imagination, is not only unhealthy for the parties concerned, but reflects seriously upon the entire business.

Taking the elements entering into an estimate as units, the area remaining constant, no contractor can purchase his material at such a more advantageous price than his competitor as to justify a "material" variation greater than three to four per cent. The labor figure should not have any greater intrinsic variance than the above figures. Mechanics, when averaged, produce approximately the same number of "result-man-hours" per day; therefore, the labor cost cannot be the source of the oft recurring wide differences in the final bids. The only factor remaining to be considered is the "added percentage," consisting of "overhead" and "profit."

Again limiting ourselves to a prescribed territory or area, the "overhead difference of shop operation" will not vary more than five or six per cent. taken on the whole, though perchance in rare instances the variation may reach eight per cent. Hence at "profit" may the greater portion of the censure, if such we may term it, be aimed.

Injures Electrical Interests.

Repeating the old adage, "There are none of us in business for our health," every fair-minded business man or woman wants to see the other fellow make a fair or legitimate profit. But on the other hand, the consistent, almost illegitimate practice of "wild-cat" bidding is not only financially and morally disastrous to the party concerned, but is injurious to the entire electrical business.

The end of all paths is reached sooner or later; the policy of borrowing from Peter to pay Paul only accelerates the velocity along the downward path. If an estimate is submitted whose figure is far below the "average cost" of the other competing firms, only one of two conclusions is possible. Either a serious error has been made in the estimating of the job, which most assuredly is not the case when such wild figures are submitted consistently, or the contractor in question contemplates evading the terms of the contract.

Why can we not get together and work in harmony — really and truly co-operate? Why cannot all estimates be based not only on the correct "cost" but on a desire to render an honest service in return for a just compensation.

Every foot of wire installed, be it in an humble cottage or in an elaborate skytowering structure, becomes a monument to the contractor and to the business. Why can we not arrive on that plane of co-operation so that we may designate with pride each and every installation as a lasting testimonial to our business and to ourselves? A. T. Hines in Electrical Contractor-Dealer.

Scottish interests are planning to obtain 42,000 electrical horse power by harnessing three lakes and utilizing the water power running to waste in the watershed of the Tay.

The Labor Conditions of To-Day

Paper Read Before Ohio State Association of Electrical Contractors and Dealers by Marvin W. Hansen, Well Known Contractor-Dealer of Toledo

I believe in organized labor because I believe in organization. If you did not believe in organization you would not be here; therefore you believe as I do, perhaps not in detail, but certainly in the fundamentals.

I do not believe in selfishness to the extent of hurting the other fellow. In this you will at least concur to the extent of professing it. Whether you live up to it or not is another question.

Believing as I do in organization, it naturally follows that I believe in co-operation, which is the reason for organized effort. Therefore I must go further and in lieu of selfishness to the extent of hurting the other fellow, I must grant him the privilege of organized effort, and having granted him his right, I should be inconsistent indeed to refuse to recognize his organization.

Were I to face this organization single handed I would in my opinion be headstrong, to say the least; so as an organization man I should lose no time in organizing to meet him. Then when he said to me: "You must recognize my organization," I would promptly say to him: "Sure, and the same to you, sir." Organizations will have to get together and settle all of this for us, and when the organizations are satisfied, you and I as individuals had better be.

Advantages of Organizing

Let us take the net result of following this formula of meeting organization with organization. First you are sure to make a mutual settlement. You cannot expect the other fellow to draft a contract in your favor and present it to you; you must be a party to the contract before it is drafted. You cannot expect the other fellow to look out for you. As an individual you could do nothing with an organization, as that organization would have a dozen individuals or more to deal with; so it could not be expected to satisfy all. Thus many an arbitrary and unjust labor agreement has been imposed upon the employer and accepted only because the employers concerned were not organized to meet their labor organization on an equal basis.

So much for the labor agreement. Now for the economic side of the question. Should you consider it your right to deal for your labor in the open market—and right here let me make it clear to you that I grant you that right and I hope it will never be taken from you, because if that right should ever be taken from anyone, it would spell the finish of labor and of trade organizations and set commerce back in the train of progress at least fifty years.

You may ask how this is possible, and I will tell you that no organized effort can long endure without opposition; and when the individual's rights are withdrawn, then the organization becomes all powerful. Without opposition it could not long endure and would crumble of its own weight, due to the lack of the natural law of opposition. Right here let me send home with you this thought: You cannot build up any organization into a powerful influence in any community unless there exists in that community a reason for the existence of that organization.

Now then if we have powerful organizations in our midst today there must have existed a reason for them. There did exist a reason or they could not be here now. The labor organization was conceived in the days of rank competition born of the law of self preservation and fed by the spoon of class hatred; and what an unruly child it has developed! Is

it any wonder that it should be unruly? And what do you do with an unruly child? Take the best that is in the child and develop it.

Don't ever try to reform a child by killing it, especially when you know that to kill it only means that there will be ten more vigorous ones to take its place. If you want to curtail the fighting power of any organization of men, don't try to do it by fighting it.

Pick out the good in the institution and develop it and the good will soon outweigh the evil; for remember any organization has a lot more good in its makeup than it has evil. The process of utilization will work out a process of elimination and thereby make for the best.

Believes in Trusts

Labor unions are a godsend to our industrial system; and by the same token, so are the trusts. Take it in our own business. The General Electric Company has done more to promote the electric field than any other factor. They have spent more money in the development of high efficiency lighting units than all the other interests combined. They have spent more money than any other interest in the development of the electric power field and they have spent untold fortunes in the development of every other line of electrical endeavor. They may at times step on your toes, but believe me they are largely responsible for our having shoes on our feet that we could come out of the affair with our toes not crushed.

Some of you old timers will recall that I was at one time very pronounced in my views against the Electrical Manufacturers' Association. Well, I am here today to tell you that I was all wrong. You know a man and a mule will change their minds, but a hog never will. The electrical manufacturers have done a wonderful work in development; in standardizing of material and of maintaining quality. Here is a case wherein co-operation will find a ready reciprocation, and great benefit will be derived, but if you try elimination you will only develop a fine sized opponent who will have to fight back and you will develop the evil and eliminate the good.

In my opinion things are not half so bad in the electrical field today. We have six different viewpoints to look at the industry from. The public viewpoint is of course the most important and I believe the least considered. Then you have the electrical contractor-dealer, the first step removed from the public. His viewpoint should be broad and he should never get away from the fact that he is the man the public look to. He gets the first grief.

Then comes the jobber, and he must be the buffer between the contractor-dealer and the manufacturer. He should be a step removed from the public and should reach the public through the contractor-dealer. He is essential, and the jobbers' organization is a factor that can be developed to be a great help to all.

Then comes the fourth party, the manufacturer. He should of necessity deal with the jobber more than with anyone else. Then comes the central station. The central station man is largely a missionary man, and as such he has worked wonders for all of us. He has developed a demand that the contractor-dealer, the jobbers, and the manufacturers neglected and had we not neglected it, the central station could not have successfully entered the appliance field. Think it over and see how many electrical men in your city have entered into the appliance game since the central station has paved the way.

This leads us back to labor interest—the sixth and last interest on which all our interests depend in a greater or lesser degree. Labor is fundamentally 95% of the value of all merchandise and being 95% fundamental it is more essential

that we get value received in the purchase of labor, than in any other item. Now then it is a poor rule that does not work two ways, and you must be as willing to give as to receive. You should demand value received both ways; then all concerned will be properly compensated, and all should be satisfied.

Handle it Fairly

The present condition of the labor market is very critical and should be handled fairly and scientifically. We are paying for labor 100% more than we did eight years ago, and we are paying it with a dollar that has only 33% of the purchasing power that it had then. These figures will be sustained if you take the merchandise in our own line. Take twenty-five articles at random and compare the prices of eight years ago and those of to-day, and you will find these figures substantially correct. It will not do to cut labor before you cut other prices. In other words, the purchasing power of money must be made greater before you can expect to purchase more labor with it, and this will never be accomplished by the method that many employers are now trying to use; namely, the closing down of industry and forcing labor to come to terms that will enable capital to enjoy the benefits of the present high prices and to derive that enjoyment at the expense of the producing masses.

Therefore it is my opinion that never before in the history of the industry in which we are engaged and in fact in all other branches of industry, was it so necessary for all concerned to co-operate and to meet the other fellow half way. This can only be accomplished by the different associations working together.

This is an age of co-operation and now is the time to co-operate. Don't try to bring about the readjustment of affairs by revolution. Let's take what we have and build it up. This is no time to take things down. Let's all pull together and forget all selfishness and all revengfulness; and let's show the whole country that the electrical interests are for industrial peace and prosperity. And in closing I wish to again declare that I believe in association and I am for them all.

Pricing Time and Material Work—How Do You Do It?

In introducing our Contractor's Department in the issue of January 1st we stated that we did so in the hope that it would become an Open Forum for electrical contractors all over Canada who would bring their questions, opinions and problems forward for discussion and solution. The success of this department must depend very largely on the extent to which contractors use it. A very pertinent question is here raised by Mr. Roach, manager of the McNaughton-McKay Electric Company. This company is one of the largest contracting and jobbing houses in the border district, and our readers will appreciate the following letter:

Windsor, Ont.

Editor Electrical News:

Regarding the maintaining in the Electrical News of a department for Contractors, it is the writer's opinion that this department can be made very useful if the co-operation of a large number of contractors could be obtained, that is, if each person who reads this department will realize that others are just as interested in what he is doing, and how he is handling the details of his business, and resolve to tell the editor how he has overcome some difficult problem.

A question which suggested itself to the writer and one which we would like to hear from the other contractors about, is that of pricing time and material work. We believe that practically all contractors do a certain amount of work

for which there is no price given in advance. I can safely state that over 75% of the work done by our firm is done on this basis and in any event the same method of pricing can be applied to a job either before or after the work is completed, or while it is under way, as the objective is the same in each instance. Unless the pricing is to be done by some person thoroughly conversant with prices it is necessary to furnish the price clerk with a complete price book, and to see to it that it is at all times kept up to date. For this purpose as well as for retail store sales, we have found the price book supplied by the Henderson Business Service, Brantford, Ont., to be a **godsend**. This service is very complete and the publishers have shown a desire to improve their service, and to adopt all useful suggestions of their subscribers. This service is being used by nearly all of the dealers and contractors in the Border Cities and by the local Hydro Commission.

We are desirous of knowing how many Contractors and Dealers are using this service and their candid opinion of same, or anything at all regarding their method of handling this detail.

Respectfully,

McNaughton-McKay Electric Co. Ltd.

A. E. Roach, Manager.

Will You Pass Judgment on These Estimating Sheets for the Benefit of the Committee?

In recent issues of the Electrical News we have reproduced forms used by different contractors in estimating the cost of jobs and making contracts with their customers. As a result we are in receipt of a number of other forms used by contractors in various points in Canada, and a number of letters all indicating the keen interest they take in this subject and all, also, urging the necessity for standard forms which might be made available at less cost.

Regarding the matter of cost, it may be said that the reproduction of ruled forms involved at best a somewhat considerable expense. If every contractor requires a form to suit his individual needs it follows naturally that the expense of these forms will amount to a considerable item. If on the other hand it were possible to prepare a form that would meet the requirements of the great majority of Canadian contractors, and if the supply of these forms could be handled through a central office, for example through an electrical contractors' association, we believe there would be very little complaint on the score of expense.

As the result of a number of suggestions that have been made along that line the matter of a standard estimating system has now been actively taken up by the Open Price Committee of the Toronto Electrical Contractors' Association. At their regular monthly meeting held on January 20th a committee consisting of Messrs. R. A. L. Gray, chairman; George Kay (Bennett & Wright, Ltd.), Harry Rohleder (Harry Alexander, Ltd.) was named—and they willingly accepted the appointment—to meet and consider what could be done. The standard sheets used by the National Association of Electrical Contractors and Dealers and the Chicago Estimators' Association are to be taken as the basis of their conversations, and the report will probably take the form of criticisms and suggestions regarding these sheets.

To give our readers an idea of just what is being done we reproduce in this issue three of the forms. Fig. 1, which is the Estimating Sheet of the National Electrical Contractors' Association contains practically all the items to be found in a job of fair dimensions. It is possible that this sheet will be suitable for 90 per cent. of our contractors. Indeed it has frequently been criticised as being

National Association of Electrical Contractors and Dealers Universal Estimate Sheet.

NO. LIGHTS Bid Goes to
 NO. SWITCHES Address
 NO. CIRCUITS Architect or Engineer
 NO. BASE PLUGS Address Architect or Engineer
 NO. TELEPHONES Name of Job or Building
 NO. MOTORS Location of Job or Building
 I. P. MOTORS See Mr. Telephone No.
 K. W. GENERATOR Bid Must Be In By M Salesman
 SWITCHBOARD
 Material Estimated by Labor Estimated by Priced by Approved by

ESTIMATE NO.
 SHEET NO.
 DATE
 JOB NO.

REMINDEES	QUANTITY	DESCRIPTION	PRICE EACH	TOTAL COST	LABOR UNIT	TOTAL LABOR
Conduit, Rigid						
Conduit Elbows						
Conduit Bends						
Conduit Straps						
Conduit Hangers						
Lock Nuts						
Conduit Flexible						
Conduit Fittings						
Conduit Non-Metallic						
Cutting Tools						
Bracket Boxes						
Switch Boxes						
Fuse Boxes						
Fuse Holders						
Fuse Covers						
Fixture Hangers						
Outlet Cabinets						
Pushbuttons						
Metering Panels						
Meter Lamps						
Outlet Boxes						
Asbestos						
Outlet Boxes						
Fuse Plugs						
Enclosed Fuses						
Flush Switches						
I. P. Flush Switches						
1 Way Flush Switch						
2 Way Flush Switch						
Snap Switches						
I. P. Snap Switches						
2 Way Snap Switch						
4 Way Snap Switch						
Knob Switches						
Door Switches						
Pushout Switches						
Rubber Covered Wire						
Lead Covered Wire						
2 Core Wire						
3 Core Wire						
4 Core Wire						
Reinforced Cord						
Insulating Tape Cord						
Shaw Window Cord						
Insulating Cord						
Molding Metal						
Molding Filing						
Insulators						
Clippers						
Key Boxes						
Keyway Sockets						
Wall Sockets						
Recesses						
Recess: Bushings						
Cord Adjusters						
Shades						
Shadeholders						
Adapters						
Attachment Plugs						
Lamps Incandescent						
Lamp Guards						
Arc Lamp						
Cleats						
Knobs						
Tubes						
Screws						
Nails						
Toggle Bolts						
Annunciators						
Annunciator Wire						
Annunciator Cable						
Reverser Cable						
Bells						
Buzzers						
Push Buttons						
Bus Cord						
Door Openers						
Burglar Alarm						
Batteries						
Bell Ringers						
Telephones						
Telephone Cable						
Speaking Tube						
Whistles						
Letter Boxes						
Tape						
Solder						
Compound						
Acid						
Gill						
Car Vars						
Carriage						
Joint						
Drafting						
Inspection						
Inspector's						
TOTAL						
BID SENT TO FOLLOWING:						
MATERIAL						
LABOR						
OVERHEAD EXPENSE						
PROFIT						
BID						

Fig. 1—A Comparatively Simple Estimate Sheet. Note the "Reminders" at the left hand side of the sheet.

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PRICING SHEET

FORM 2

SYSTEM				SHEET				EST. NO.	
NAME OF JOB				CHECKED BY				DATE	
BY	BY	PRICED BY	MATERIAL	QUANTITY	MATERIAL UNIT	EXTENSION	LABOR UNIT	EXTENSION	ITEM NO.
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Fig. 2—Pricing Sheet suggested by Chicago Estimators' Association

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SUMMARY

FORM 3

JOB				APPROVED BY				EST. NO.	
BY	DATA	CHECKED BY	SHEET NUMBER	SYSTEM	MATERIAL	LABOR	DATE	TOTAL	
CEILING OUTLETS									
BRACKET									
PLUG RECEPTACLE OUTLETS									
CEILING									
FLOOR									
FAN									
DECORATIVE									
CEILING SWITCH									
WALL									
DOOR									
PHONE									
TOTAL									
TOTAL LIGHTING WATTS									
CONNECTED CIRCUITS									
NO. OF MOTORS									
MOTOR H. P.									
TOTAL LABOR									
DAYS									
INCIDENTALS									
BOND									
PRO RATA CHARGES									
INSURANCE									
WATCHMAN									
TELEPHONE									
DRAWINGS									
CUTTING AND PATCHING									
LICENSE									
INSPECTION									
STORAGE									
PAINTING									
FREIGHT AND CARTAGE									
TRAVELING									
BOARD ETC.									
TOTAL \$									
NON-PRODUCTIVE LABOR									
JOB SUPERVISOR									
CLERK									
HANDLING MATERIAL									
DELAYS & CONTINGING									
TRAVEL TIME									
TOTAL \$									
INCIDENTALS (SEE SCHEDULE)									
NON-PRODUCTIVE LABOR									
TOTAL MATERIAL									
TOTAL LABOR									
COST OF MATERIAL AND LABOR									
25% OVERHEAD									
NET COST									
20% PROFIT									
SELLING PRICE									
REMARKS									

Fig. 3—Summary Sheet necessary on larger jobs—Chicago Estimators' Association

too complete and costly, and one of the aims of Mr. Gray's committee will be to curtail, if possible, the number of items and the size of this sheet.

The other forms shown in Figs. 2 and 3, are the Chicago Association's Pricing Sheet and Summary and would be used on jobs where the Estimate Sheet would not be of sufficient size to take care of the whole building. For example in estimating the cost of the installation in a factory of half a dozen floors, the usual method is to take off the materials floor by floor. This would involve the use of six of the large estimating sheets. In such a case the average contractor would use blank sheets for figuring his branch circuits, panels and feeders, and having taken all the details into consideration, would place his totals on the Pricing Sheet, summarizing the whole thing on the sheet marked Summary. In other words, these two schemes provide for two distinct classes of work, the smaller job, which can be included on the Estimate Sheet and the large job which does not use the Estimate Sheet at all, but is taken care of by the Pricing Sheet and the Summary.

As we noted above, it is probable that this Estimating Sheet is the one that will interest 90 per cent. of the contractors—men doing up to fifty thousand dollars worth of business a year, say. We would urge our contractor readers to study this system carefully and let us have your opinions about it. It will be a pleasure to pass these along to Mr. Gray's committee. Now that the contractors have got this scheme started and are earnestly at work on it, let us put our might behind it to get the best possible results.

Contractor Gives Evidence Favoring the Use of Estimate Sheet

A number of our retail contractors have very kindly responded to our request for assistance in preparing a standardized estimating sheet, and have sent in helpful suggestions accompanied in some cases by copies of their own sheets. This has been very helpful to us, and we hope we shall have a great deal more of this kind of co-operation. Below we print a letter just received from Mr. La Chapelle of Meaford, who sends us also a copy of his estimate and contract form. Mr. La Chapelle realizes that this is not an ideal form, but, as he says, he has thought it out himself, without suggestions or assistance from others, and our readers will agree, we are sure, that it is a very great improvement on "nothing at all."

Editor, Electrical News:—

In regard to estimating sheets, here enclosed you will find the only sheet I use. I use this sheet for taking a job by contract price or by hour work and materials, the same sheet does for both a contract job, which we give a contract price on, or for a job which we put in by time and material. I have been using these contract forms for over two years now and my experience is that the contract sheets have proven to be a great success since I first started to use them.

Before I used any contract sheet of this kind, I used to meet an odd case where there would be misunderstanding on the customer's part, but now, since I have been using these sheets, everything is in black and white; we give the customer a copy and we keep a duplicate. I have also found since using these sheets that we never have any trouble in getting our money from the jobs we instal. There are, no doubt, electrical contractors who have a more up-to-date contract sheet than mine, for this sheet is one I thought out myself. I think probably if you can get a hold of a few different contractors' sheets, that between them all we can make an A1 estimating or contracting sheet.

Yours truly,
Carl La Chapelle.

CARL LA CHAPELLE

Electrical Contractor

Meaford

DATE

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CONTRACT FORM

TO

I hereby agree to install the following Electric Equipment in the premises of above, same to be installed in accordance with the Rules and Regulations of the Hydro Electric Power Commission of Ontario and fifty per cent. of work and installations made to be paid for when work is completed and balance to be paid me in full on presentation of final clearance certificate from the Hydro Inspection Department.

DISTRIBUTION OF EQUIPMENT

	Basement	Ground Floor	1st Floor	2nd Floor	3rd Floor	4th Floor	5th Floor
Light Outlets							
Flush Switches, single pole							
Flush Switches, 3 point							
Pull Chain Switch							
Snap Switch Single Pole							
Snap Switches, 3 point							
Snap Switch, Double Pole							
Sign light							
Fixtures							
Motors							

Price per hour for work

and all material used extra

Contract Price

Miscellaneous

SIGNED

I hereby accept the above agreement

SIGNED

Form used by Mr. LaChapelle.

Have We Any Cause to Talk "Depression?"

A summary of the electrical needs of more than two hundred and fifty Canadian towns and cities distributed from coast to coast indicates only 7.3 per cent. saturation on the average. These figures are startling in the definiteness with which they point to vast sales opportunities. Here are the figures:

Houses wired—74.9 per cent.
Degree of saturation of wired homes:
Electric Ranges—3.1%
Elec. Percolators—3.7%
Elec. Vacuum Cleaners—5.0%
Elec. Washing Machines—5.9%
Elec. Dishwashers—.07%
Elec. Water Heaters—1.3%
Elec. Toasters—18.2%
Elec. Air Heaters—4.8%
Sewing Machine Motors—1.2%
Elec. Irons—45.7%
Elec. Ironing Machines—.14%
Elec. Refrigerators—.06%
Elec. Fans—5.4%



BETTER MERCHANDISING



Electric Stores for Electric Goods

This Means Standing Behind the Electrical Dealer and Withdrawing Support from Hardware Stores and Other Outside Competitors

A window card exhorting the public to "buy electric goods in an electric store" is prominently displayed in the window of the appliance department of the Canadian General Electric Company, King St. West, and evidently defines the policy of that company. It is a very satisfactory sign of the times, and we trust the policy of this company will be followed by manufacturers and jobbers throughout Canada. Electrical contractor-dealer associations all across Canada and electrical contractor dealers individually, backed by the urgent editorial support of the Electrical News have repeatedly pointed out the necessity for manufacturers, jobbers and contractor-dealers supporting one another consistently in order that the greatest possible development of the industry may result.

The faults of the past have not been confined to any one section of the industry. Electrical manufacturers and jobbers have endeavored to market their goods through hardware and other stores, but in defense of this course it must be said that the electrical stores often did not exist in sufficient quantities, nor was their policy sufficiently aggressive, to take care of the demand. This condition is improving, however. Electrical stores are more numerous and infinitely better equipped and managed than was the case a few years ago, and therefore the necessity for handling goods through hardware and drug stores is rapidly disappearing.

The quicker this condition can be brought about the better for everybody in the industry, and we are firmly of the opinion that every electrical manufacturer and jobber today would be justified in adopting the slogan "Buy electric goods in an electric store," and religiously living up to all that it involved. If manufacturers and jobbers continue to encourage hardware stores to sell electrical goods and sit back and wait for the electric stores to develop of their own accord it may be a long time before the retail end of the industry is able to stand on its own feet. If on the other hand the manufacturers and wholesalers are prepared to take a definite stand in support of the electrical dealer, to give assistance and encouragement towards the establishment of a store where there is none, to give the necessary backing to the men who are already in business, but who perhaps lack both experience and capital, the desired results will be attained much more quickly and with much more credit to the trade in general. Hardware stores can never give electric service, and service is one of the chief claims that can be made for all electric equipment. The sooner we eliminate the hardware store from the electric trade the better for everybody concerned.

Plans are being prepared for the erection of a hospital by the Municipality of Outlook, at an approximate cost of \$70,000. A complete X-ray outfit will be required by the institution.

The Dignity in Electrical Merchandising Lies in "Better Service"

Slowly perhaps, but surely, the electrical contractor-dealer is awakening to the possibilities of the electrical merchandising field, and to the advantages to be gained in going after this business in an intelligent and systematic way. It is beginning to dawn upon his consciousness that the slipshod guessing methods of some contractors will not do for the merchandising of electrical equipment. There is a marked evidence of improvement—slight in some cases, but none the less evident—in appearance of the average dealer's store. He is paying more attention to locality, to density of population, to trade and traffic currents, and to the type of store best suited for the handling of electrical equipment. There have been quite a number of cases all over the country during the past year of dealers moving into larger and better arranged stores, or extending their present facilities. In some cases the dealer while opening a new store has retained his old location from which to handle certain classes of goods, such as lighting fixtures, plugs, bulbs, wire, etc., using his new store as a basis for operations along the lines of electrical labor-saving devices such as washers, vacuum cleaners, etc.

The vision of the dignity of "electrical service" is slowly percolating through his intellectual consciousness, and the average dealer is putting up a better window display than has been customary for that gentleman to present to the public since the process of evolution brought him into existence. The avalanche of education that has been hurled at him from all sides by the army of diversified electrical "experts," is beginning to have its effect. The germ of specialization has taken root and is at work. Evidence of its growth is to be seen in the better arrangement of stocks in the average store, the tendency to handle certain well advertised, quick turnover, profit making lines, the growing predominance of unit-type window display, the desire on the part of so many dealers to be known in their district as sole agents for certain lines of appliances, the increasing tendency towards sales contests, guessing competitions and so on. In all his advertising campaigns, window displays and contests of every kind, the dealer should aim to uphold the standard of dignity inherent in the nature of the service—which he, as an electrical dealer, performs on behalf of the public—to say nothing of his own personal dignity and standing in the community which he serves. Furthermore, it is a characteristic of human nature to cease to desire anything that "smacks" of the "free for nothing" idea. It is a fact that we only get what we pay for, and by practicing and preaching this doctrine in his business the electrical dealer is not only sustaining the dignity of his calling, but is instilling sound, thinking into his constituents, with the result that these great "price reduction" stampedes, "chance-of-a-life-time" brain-waves, and "holding off buying" epidemics, such as we are experiencing in other lines at present, are greatly minimized, and the public get the sane habit of expecting one hundred cents value for the dollar—which in actuality is all they ever do get.

As we review the field then, at the beginning of a new year, there seems to be a decided call for leadership in the direction of "Better Merchandising." Some there are who have answered the call, some would like to answer it, and

some few there are who hear it not. Those who have answered it intelligently and with faith in themselves and in the call, have no need to look back except with satisfaction in the success that has attended the venture. To those who would like to answer it, but who for financial reasons, or owing to the spectre of doubt haunting their minds, have refrained from doing so, we can only quote from one successful merchant whose motto is "he who cannot say 'I believe' is on the road to failure."

Electrical Workers Dispute Settled—Award of Board of Conciliation in Nature of Compromise

Approval of the award made by the Board of Conciliation which investigated the dispute between the British Columbia Electric Railway Company, the Vancouver Power Company, The Vancouver Island Power Company and local unions 213 and 230 of the International Brotherhood of Electrical Workers has been given by Hon. G. D. Robertson, Minister of Labor. Many changes in working conditions were decided upon, but neither an increase nor decrease in wages for the electrical workers was recommended. Although a reduction in the wage scale was requested, based on the claim that the companies involved paid their employees higher wages than were paid electrical workers elsewhere in the Dominion, the board decided that the present time was not opportune and recommended that the present scale be maintained.

Under the new agreement which is between the companies and the I.B.E.W., not as before between the companies and the two locals, the companies have a right to employ any qualified electrical worker who carries a brotherhood card. Under the old agreement the companies were compelled to employ men of locals 213 and 230 only. Free transportation is granted all employees at all times over all lines in the city where they are employed or over the inter-urban district in which they are working. Provision is made for free transportation once a week for the wives and families of workers. In cases of lay-off of men, efficiency and seniority are to be taken into consideration. Where three or more men are placed under the orders of another employee, the latter shall be a foreman. All foremen must have had at least three years' experience in one or more branches of the trade. Under the new agreement sub-foremen shall not be required to handle tools where the work is hazardous. Overtime is to be computed on the basis of an eight hour day and the rate shall be double time of standard rate. Relief for at least a period of eight hours out of every twenty four must be given.

The chairman of the board was Mr. H. H. McGeough, appointed by the Minister of Labor; the companies were represented by Mr. A. G. McCandless and the employees' representative Mr. E. H. Morrison. Endorsed copies of the award were signed by the parties concerned.

J. C. Downie Addresses Manitoba Electrical Association

On Thursday, Jan. 20th, the Manitoba Electrical Association held a successful luncheon, the guest of honor being J. C. Downie, Governor of the Manitoba Provincial Gaol, his subject being "Prison Reform." Mr. Downie compared the prison life of today with that of the olden days when the prisoners were brutally treated. He said that everything was done today to try and improve the conditions of the unfortunate prisoners; they were well fed and clothed, and everything done to assist them during their stay in gaol, in order that they may see the better side of life on their release. The speaker enlightened his audience on prison farm life, stating that the prisoners were all trustees, and

were not kept under lock and key. They worked eight hours a day, and all seemed quite contented. The cost of feeding a prisoner was twenty-seven cents a day; of course the prisoners grew their own vegetables on the prison farm.

At the Provincial Gaol in Winnipeg they have a school for the three R's, meaning thereby for those prisoners who cannot Read, Rite, or do Rithmetic, the teachers being University and College men who unfortunately have gone astray.

At the conclusion of Mr. Downie's interesting address Mr. W. F. Minty purchasing agent of the Manitoba Government Telephones expressed regret on behalf of the Manitoba Electrical Association at the intending departure in the near future of Mr. F. L. Butler, general superintendent of the Winnipeg Electric Railway Co., who is removing to Atlanta, Georgia, to take charge of the City and Inter Urban lines. Mr. Butler thanked Mr. Minty for the kind words spoken, and stated that he was leaving Winnipeg with many regrets, as he had made many friends in that city.

Mr. R. F. Johnston of the Northern Electric Co. was the lucky winner of the boudoir reading lamp, presented by the McDonald Willson Lighting Co., to be drawn for.

Where There is "Life" There is Hope—Don't Make Demonstrations Over-Monotonous and Mechanical

It seems to be a generally accepted idea that in window demonstrations where living models are used, the said models should imitate the marble statue idea, and act as mechanically as possible. As far as the demonstration of electrical appliances is concerned, this, we think, is the very opposite of what should be. Only recently the writer witnessed a practical demonstration of a prominent violet ray machine in the window of a large store operated by a central station. The window was bright and clean, and the arrangement of the various types of a violent ray machines was good. So far as the personal appearance of the lady demonstrator was concerned, there was nothing to complain of, but the way she performed her part and her facial expression were such that she might have been an electrically operated dummy so far as the public were concerned. Those who doubt that personality enters into window demonstrations, just as in selling over the counter, have only to compare the speaking stage with the silent picture drama for a practical illustration of the fact that personality has other ways of expressing itself than by the use of the voice. A motion picture artist can transmit his emotions to his audience in many ways, such as by facial expression—which is one of the best outlets—by the movement of his body, by his dress, etc.

The electrical-dealer's window is the screen upon which he flashes the many sided wonders of his story, some comic, some dramatic, some aesthetic, some commonplace, but all capable of interesting his audience—the public. He should be as careful in choosing a living model for a demonstration as the stage manager is in choosing an artist for a leading part. No stage actor can ever succeed who does not have a good imagination and is capable of feeling the part he has to play. So it should be with the window demonstrator. He or she should have a good mental picture of the aims and objects to be attained. She should not be over sensitive and yet not a mechanical toy. She should remember that the people are not stopping to look at her, but at what she is demonstrating, and she should aim to lead their thoughts and attention to the thing she is doing. She should be capable of smiling once in a while—it won't hurt anybody, and will help a lot to put the crowd in a good humor—and the more unusual and artistic she can be in the demonstrating of the article, the better.

There is not much use in putting a ticket in the window

asking people to step inside, and along side the ticket put a demonstrator whose freezing attitude can be felt through the window pane. Preferably the demonstrator should be one of the clerks of the store and not a so-called "expert" supplied by the manufacturer. They are frequently so expert that they have long since reached the mechanical stage. The explanatory cards accompanying the demonstration should not be too general in statement, but as specific as possible, and the demonstrator should be made to refer to them constantly, thus keeping up the interest of the onlookers. While possibly one of the most difficult branches of salesmanship, and unfortunately one of the most despised, yet when handled by a skilled artist, it can be made one of the most attractive educational and profitable means of advertising that the electrical dealer can use.

Fixture Manufacturers Please Note—Letter in Last Issue Meets with General Approval

407 Spadina Ave., Toronto.

Editor Electrical News:

Referring to Ellis & Howards letter in Jan. 15th issue of Electrical News, I take pleasure in giving my views on this subject.

This is to me a question that has been brought up at the most favorable time, by allowing manufacturers to adjust their system of packaging so as to receive the full benefit of the dealers' trade.

At the present time electrical dealers are more enthusiastic than ever about the general appearance of their stock, which I firmly believe is one of the best features, not only for drawing custom but to keep the best class of trade. The present method of packing fixtures in bundles makes it extremely difficult to keep shelves looking neat.

A fixture dealer to properly handle his stock, must reduce to a minimum any waste which is caused generally by packages being too closely bundled together thereby dinging possibly several canopies or pans in each lot. These are next to impossible to reshape perfectly.

At present one or two firms are packaging their fixtures in cartons with the serial No. and details plainly marked on a printed label. I have been buying lately from these firms, and I consider the time saved by being able to check my stock at a moment's notice and the saving in damage, which I find is reduced to practically nothing, is well worth consideration.

In my estimation the one way of solving this problem is for the dealer to patronize the manufacturer who takes time to properly package his fixtures and by so doing is looking after the welfare of the dealer and making sure of continued orders.

Yours truly,

J. E. Day,

Electrical Installations

* * *

Guelph, Ont.

Editor Electrical News:

In reference to the suggestion of Ellis and Howard for packing electric fixtures, I certainly agree with them and will be willing to pay my share of extra expense for packing, as I know I will be away ahead at the end of the year.

Yours truly,

W. W. Stuart,

* * *

Meaford, Ont.

Editor Electrical News:

I certainly agree with Messrs. Ellis & Howard with regard to the better packaging of electrical fixtures. Among the different companies we deal with there is only one that puts the fixtures in cartons and marks the name, style or

finish, number of lights, and the number of the fixture on the outside of the carton. This is the way, I think, all fixtures should be packed, as, when one buys in large quantities, one can arrange them properly on the shelves, when there is no room for them to be hung from the ceiling.

Yours truly,

Carl La Chapelle.

* * *

Toronto, Ont.

Editor Electrical News:—

Referring to the letter of Messrs. Ellis & Howard in your issue of January 15th, regarding faulty packaging of electric fixtures shipped from manufacturers. It would no doubt save considerable breakage if the cartons were plainly marked as suggested. There would also be a saving of time to the dealer on re-assembling.

I believe the manufacturers would make the improvement if their attention was properly called to the subject.

Yours truly,

K-C Electric Co.

F. H. N. Casey.

* * *

Toronto, Ont.

Editor Electrical News:

Reference to the letter in Jan. 15th issue from Ellis & Howard relative to the usual manner in which Canadian manufacturers put up their fixtures, we certainly agree with Ellis & Howard. Electrical fixtures actually made or assembled in Canadian factories usually receive scant attention in the packing.

Yours very truly,

Ias. Devonshire Ltd.

J. Devonshire.

* * *

St. Catharines.

Editor Electrical News:

We heartily agree with Ellis & Howard re fixture packages and think that about two or three standard packages would do and save much time and money for every dealer during the year.

Yours very truly,

The Electric Shop.

A. J. Desand.

* * *

[unclear]

Editor Electrical News:

I am sure that the suggestion re packaging fixtures, in your issue of Jan. 15, would be a big stride ahead. A great deal of untidiness is caused through the very poor system of packing fixtures, more especially, I think, around the work shop, to say nothing of the damage done to the fixtures.

I think everybody would gain if they were packed in cartons separately, and if possible, a print of each kind on the boxes.

Yours very truly,

George Williams

* * *

West Toronto.

Editor Electrical News:

Further re letter published in Electrical News from Ellis & Howard. We feel sure that electric fixtures packed in cartons by the manufacturer with number and finish printed, stamped or written on same would be a great advantage. It would not only be the better way of packing, but also a great saving and convenience to electrical fixture dealers and would not cost the manufacturer much more, if any, than the system now used by most of them.

Yours in everything Electrical.

Oran's Electric.

La Duchesse "Automaton" Out of Place on Electric Sales Staff—A Cheery Countenance Wins Its Way

By C. O'D.

While going along the street the other day, I suddenly remembered, as I passed an electric shop, that I was in need of a two-way plug for my kitchen outlet. I stopped, retraced my steps, and paused at the entrance to the store to gaze at the attractively arranged window display. The window glass was shining as if it had just been polished. Everything in the window was systematically arranged, and handsome portables streamed down a soft light upon the shining appliances. The store, too, looked inviting, and the whole atmosphere of the place seemed to say "come in," so in I went to buy my two-way plug. Almost instinctively I expected to be greeted by a smiling salesman, inquiring what might be my desire; but for the moment no one came. I waited a little, glancing around the store meanwhile, when suddenly I became conscious of a figure moving behind the farthest counter. Yes, it was coming slowly around to where I was. Finally it stood before me: it was the figure of a woman, but the face was turned towards the window, and was as expressionless as a sphinx. Gradually it turned towards me and fixed on me a questioning stare that seemed to see right through me. I tried to pull myself together sufficiently to state my business. As soon as I had finished, the apparition moved slowly away in the direction from whence it had come, and returned in a little while with some two-way plugs, laying them on the counter before me in a mechanical fashion, and remained motionless. As they were of a type not suited for my requirements, I ventured to enquire if that was the only kind they had in stock. The lips moved—at least I thought they did—but no sound emanated. The eyes gave me a final withering stare, and turned themselves majestically towards the window. I muttered something about not being suitable, and regretted the trouble I had given, backing to the door meanwhile, but the apparition was apparently deaf as well as dumb, and turned around and moved away as mechanically as it had come. When I got outside I drew a big breath and pinched myself to make sure I was alive, and started down the street in the direction of a little store I had passed several times on previous occasions. Yes, there it was. I knew it by the dirty signboard outside, announcing electrical repairs of all kinds. In I went. The store was rather crammed with stock, and several attendants were tripping over each other in the limited space at their command, but here was life, and lots of it. Presently a cheerful looking young woman came forward to attend me. I explained briefly my wants and in a few moments she had produced the plugs I required.

"Is there anything else?" she enquired as she proceeded to wrap up my parcel.

"Not just at the moment," I replied.

"Beautiful weather," she remarked, as I paid her and took the parcel, agreeing with her that it was, and as I stepped towards the door the voice said "good afternoon," and a moment later I was out on the street.

I looked at that signboard again. It didn't seem quite so dirty as I had thought. I felt like apologizing to it, and excusing it because its owner was busy handing out service to people like myself.

I retraced my steps by the way I had come. Presently I again passed the store I had first entered. The shining brass nameplate on the front of the polished plate-glass window, with the systematically arranged window display seemed now cold and lifeless. I could not help thinking of the polished sepulchre full of dead men's bones.

What is the moral, you ask Mr. Dealer? It is simply

this. Don't bother dressing your window and making your store neat if you have an apparition for an attendant. You are only wasting time. Beauty of window display and neat store arrangement will not in themselves build a successful business; they must be backed by intelligent, sympathetic, personal service. While the ideal condition to be sought after by the electrical dealer is where beauty and utility in store display are combined with service and the human touch, yet, better a little dust and disorder with the human touch, than much system and indifference therewith.

Hoover Dealers to Meet in Convention

The Hoover Suction Sweeper Company of Canada, Limited, have sent out notices to all Hoover dealers announcing that their second annual dealer conference will be held at the Royal Connaught Hotel, Hamilton, Ont., on Wednesday and Thursday, February 9th and 10th. An interesting program is being prepared, and the company are most anxious for their dealers to plan to have representation at this conference. The tentative program now provides for a trip through the factory Wednesday afternoon, with a dinner, and initiation into the "Hoover Club" Wednesday evening. The program for Thursday will consist of talks by different representatives of the company, and men from outside sources, on matters of vital interest to all their dealers, winding up with a big banquet Thursday evening. The dealers and their representatives will be the guests of The Hoover Suction Sweeper Company and its sales organization for practically their entire stay in Hamilton.

Different Grades of Fibre for Specific Uses

Each specific use for fibre requires a grade having the qualities necessary to meet that use in the field, and by long and exhaustive study, trial and test under actual conditions the Diamond State Fibre Company has developed different grades of fibre having the qualities particularly adapted for each use. This is particularly true of the fibre furnished for insulating block joints used in operating signal systems. They have called this grade Diamond-F railway insulation. This particular grade has high dielectric strength and is a very dense, homogenous structure, with a low water absorption which is still further lowered by treating with Diamond-F insulating paint. This coating protects for a certain period after being put in service in the joint, but is only used at the request of the purchaser. It has high tensile and compression strength without being brittle. Mention is also made of another of this company's products—Condensite Celoron. This material is a water-proof insulation having only approximately one to two per cent. water absorption in twenty-four hours. It is applicable to certain parts of an insulated joint. In addition to being practically water-proof, it has high compressive strength. This company carries a complete stock of sheets, rods, tubes, insulating paper, horn fibre in all thicknesses and grades at Toronto, and is equipped to manufacture special shapes and give excellent delivery service.

Kitchener First to Join Up

At a meeting of the electrical contractors on January 10th Mr. K. A. McIntyre outlined the National association benefits, and it was decided to make Kitchener the first city in Ontario, outside of Toronto, to join the National. Mr. S. F. Howard was appointed temporary treasurer pending election of officers and this branch of the National will be formed at once.

Mr. George Leacock and Mr. A. S. McCordick recently returned from a trip to Chicago and St. Louis, and report that the golf courses are in fine shape.

Window Cards Good Salesmen

Interest the Reading Public by Supplying Them with Practical Ideas

"I warmed my feet by the chilly waters of Niagara Falls last night, best sleep I ever had in my life," was the some what startling statement overheard on the street car the other evening.

"Niagara Falls. Warmed your feet! Must have pretty long legs to reach over there," rejoined a companion.

"No, I didn't reach over there, I brought the falls over into my bedroom."

"Oh, I get you! You mean you warmed them electrically?"

*Were your feet cold after you
went to bed last night?*

Why Shiver
when you can
Sleep Comfortably
with an
ELECTRIC PAD
?

Fig. 1

"Yes, that's it. They're great! For a long time I have never known what it was to have a good night's sleep because of cold feet, but last night I was off in a jiffy. You should get one!"

Now, Mr. Electrical Dealer, there are a lot of people right in your district who have "cold feet" too, and "should get one," but they won't unless you tell them about it. Most people, through ignorance, associate electric warming pads with the old hot-water bags, which is like comparing our modern electrical lighting fixtures with the oil lamps of our

**Don't burn your feet
With a hot-water bag;
But warm them gently
With an ELECTRIC PAD**

Fig. 2

grandfathers' days. Why not do your constituents a real service these cold winter nights by putting on a window exhibit of electric pads, using suitable display cards, something along the line of the suggestions given here.

For example, No. 1 incorporates the human nature appeal. Who has not known what it is to shiver in bed with cold feet. Get the human touch into your advertising. No. 2. comes under the same category.

In No. 3. we have the explanatory type of display card.

We explain what an electric pad will do towards relieving headache and inducing sleep, backed up by the opinion of a member of the medical profession to give weight to the statement.

No. 4. is of a similar nature. Here we give a few facts about the electric pad, for after all the public like something

For
Headache or Insomnia
get an
Electric Pad

A doctor's opinion: "By drawing excessive blood away from the head the pad usually cures headache, when placed at back of neck or at feet.

"Insomnia is usually the result of too much blood in the brain, and an electric pad placed at the feet will induce restful sleep."

Fig. 3

definite. This list can be augmented by further facts relative to power consumption, thermostatic control, etc.

No. 5. illustrates the appeal to the imagination. Here we suggest a picture of home, where everyone is looked after from baby to the aged and the sick. With a little thought this idea could be enlarged upon by a separate card suggesting different uses for each member of the family.

No. 6. also appeals to the imagination and the sympathies. At this particular season of the year the spirit of kindness and helpfulness is dominant in the individual mind, so that an appeal of this nature is timely and in harmony with the prevailing sentiment.

No. 7. is also an appeal to the imagination, presented in the

A Few Facts
about
Electric Pads

1. Less than one-sixth the weight of a hot-water bag.
2. If used with rubber sheathing will keep hot poultices at uniform temperature.
3. Equipped with thermostatic control and cannot overheat.
4. Can be maintained at various temperatures from 100 to 200 degs. Fahrenheit.

Fig. 4

form of a strong contrast between sickness and health, pain and comfort, and ends up with the thought of the electric pad. This can be varied to accord with different climatic conditions or local peculiarities. The main point is to use

an illustration that will go home to the heart of the man in the street; because it represents something he has felt, something with which he is well acquainted, which touches him at vital points in his daily experience.

The Electric Pad has —

A gentle warmth for Baby

A glowing warmth for Father and Mother

A high heat for the Sick One

On appliances of this nature, the opinions of medical men are valuable, and the dealer would find it interesting and doubtless profitable to obtain such opinions from the members

**Bring
Summer Cheer
to the
Invalid
with an
Electric Pad**

Fig. 6

of the medical profession in his district, with a view to using same on his window display cards or advertising campaign. This can be done without making public the names of the authorities quoted.

**COLD and DAMP
are
the friends of
RHEUMATISM
WARMTH and COMFORT
are its
mortal enemies
when allied to the
ELECTRIC PAD**

Fig. 7

Where there is a local hospital, some good direct mail advertising could be done on behalf of the electric pad. Considerable time and much running around is necessary on the

part of nurses and orderlies in keeping hot-water bags hot by emptying and refilling them. This would be largely eliminated by the use of the electric pad, and would have the added advantages embodied in the thermostatic control which keeps the temperature at a pre-arranged register, thus relieving the attendant of worry and keeping the patient from fretting.

It should be pointed out by the dealer in his advertising that the electric pad is a convenience, not a luxury; that it is as important in its field as the more commonly used electric iron, toaster, etc. The public are not slow to appropriate any device that has a practical value, and it is up to every electrical dealer to convince his constituents of the practicability of the electric pad.

New Officers of Quebec Contractors' Ass'n

At the annual meeting of the Electrical Contractor-Dealers' Association of the Province of Quebec (French section), held at Montreal, on January 17th, the following officers were elected: Mr. N. Simoneau, president; Mr. W. Rochon, vice-president; Mr. Leo Marcoux, secretary; Mr. J. A. St. Amour, treasurer. Questions of general interest were discussed. Several representatives of the English section were present, together with Mr. J. A. Mochon, secretary of the Electrical Co-operative Association.

Will Make High Power Storage Batteries

The Minimax Electric & Manufacturing Company, Ltd., 99 Bernard Lane, Maisonneuve, P.Q., have just commenced business as manufacturers of high power storage batteries for all purposes. The business is under the management of M. W. F. Cleaver, who has been connected with the industry for many years, and has had experience in Canada, Great Britain and the U. S. The company's batteries include special features, the result of considerable experiment, and which it is claimed make the batteries particularly durable and serviceable.

Have We Any Cause to Talk "Depression"?

A summary of the electrical needs of more than two hundred and fifty Canadian towns and cities distributed from coast to coast indicates only 7.3 per cent. saturation on the average. These figures are startling in the definiteness with which they point to vast sales opportunities.

Here are the figures:

Houses wired—74.9 per cent.

Degree of saturation of wired homes:

Electric Ranges—3.1%
Elec. Percolators—3.7%
Elec. Vacuum Cleaners—5.0%
Elec. Washing Machines—5.9%
Elec. Dishwashers—.07%
Elec. Water Heaters—1.3%
Elec. Toasters—18.2%
Elec. Air Heaters—4.8%
Sewing Machine Motors—1.2%
Elec. Irons—45.7%
Elec. Ironing Machines—.14%
Elec. Refrigerators—.06%
Elec. Fans—5.4%

A Discussion on the Question of Jobbers Protecting the Contractor-Dealer

The question of jobbers protecting the contractor-dealer was discussed at a meeting of the Electrical Contractor-Dealer Association of the Province of Quebec (Montreal, English, branch), held on January 17, in the Drummond Building. Mr. J. M. Walkley presided.

Instances were given where the public and large consumers were able to obtain goods from jobbers at the same prices, in some cases lower, than members of the Association. In one case it was stated that an architect was getting work done very cheaply by employing men to work at night, and another instance was cited where a contractor was obtaining fixtures from jobbers and employing men to erect them. It was contended that the jobbers should adopt some system by which the contractor-dealer should be protected. It was decided to give details of specific instances to the Electrical Co-operative Association of the Province of Quebec, and to ask the latter to take up the question.

During the discussion Mr. W. B. Shaw referred to the chart of the Electrical Estimators' Association, Chicago, published some time ago in the Electrical News. This chart gives details of the overhead cost of various jobs, according to size, and is, said Mr. Shaw, a very valuable chart.

For the information of any of our readers who have not seen this chart we reproduce it, and the explanation which accompanies it, in the Contractors' Section of this issue.

At the suggestion of Mr. Clarence Thomson, seconded by Mr. F. J. Parsons, it was agreed to contribute \$50 to the fund of the Electrical Co-operative Ass'n. This will probably be followed by further contributions. It was mentioned that the French Section had contributed \$100. The latter section has now a very large membership.

It was decided to approach the Fire Underwriters' Association with a view of securing a discount on inspection fees to legitimate contractors.

Mr. Mochon, secretary of the Co-operative Association, is about to visit several towns in the Province of Quebec. He will probably be accompanied by a representative of the French contractor-dealers and it was suggested that the English section should also be represented.

The French section have under consideration the obtaining of a provincial charter. Mr. Mochon explained the steps that are being taken. The idea was to make the business of the contractor-dealer a close corporation, members of which would have to undergo an examination by a board of contractor-dealers before being allowed to do business.

An Attractive Benjamin Catalogue

A catalogue that appeals at first glance as being developed along the right lines has just been turned out by the Benjamin Electric Manufacturing Co. of Canada, Ltd. It is of the loose leaf variety, the leaves measuring $7\frac{1}{2} \times 10$ inches. The objection one often feels towards the average catalogue, especially the larger ones that are produced at so great expense, is that before they are well off the press a number of changes or additions may be desirable. With the loose leaf catalogue it is the simplest matter in the world for anyone who is sufficiently interested to remove the obsolete sheet and replace it by the later and more up-to-date page.

The Benjamin catalogue has also been carefully sectionalized under heads, schedule 1, 2, etc., up to schedule 9, and then lastly an index. Under schedule 1 is included wire-less clusters, plug clusters, adjustable clusters and dim-a-lites. Under schedule 2, sockets, receptacles and cut-outs, and so on. Certain people will be interested in, say, reflectors and not in any of the other Benjamin products. Reflectors are treated in schedule 4, and this particular dealer

would not bother himself about filling the other schedules, nor would the Benjamin company be at the expense of supplying them. The folder, and schedule 4, is all such a dealer would receive or require in such a case.

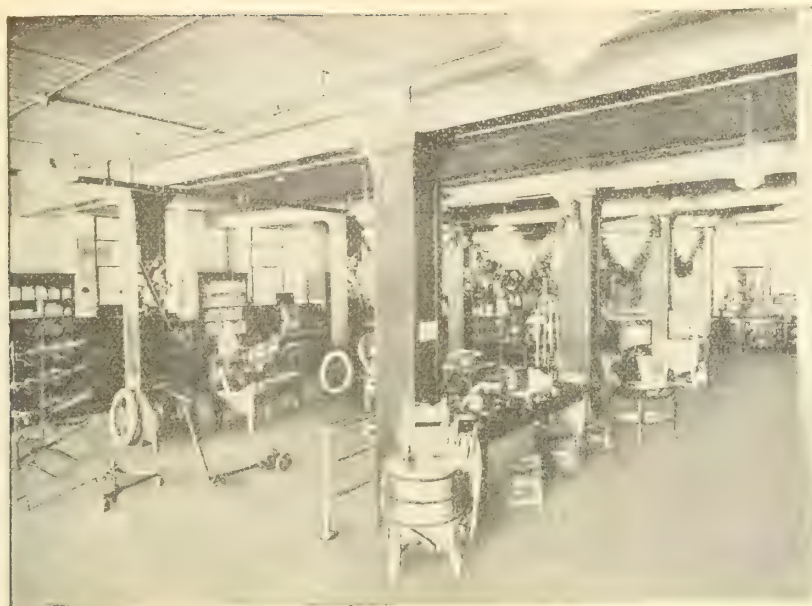
The catalogue is clearly printed, on excellent paper, and very thoroughly illustrated. Taken altogether the Benjamin company have issued a catalogue which they may well be very pleased with, and which also they may be assured will meet with a favorable reception from their customers.

Canadian General Electric Issue Attractive Booklet—Handsome Display and Club Rooms in New Building

There are few discoveries in the realm of natural science that, in their final application to the needs of mankind, lend themselves to the combination of utility and beauty, such as is found in the natural phenomena of electricity. As an automotive force it is revolutionizing the age, while the medium of its application to our everyday needs permits the use of beauty to an extent that has not yet been realized by the average man in the street, or even by those whose vocations are linked up with the electrical industry. It is beyond the ability of the most vivid imagination to conceive the electrical possibilities inherent in the water-power resources this country possesses. Enormous sums of money will be required to develop these resources, and much work of a wide and varied character will be provided, increasing in its magnitude with the development of the industry.

In its final application in the homes, offices, factories and industrial plants of our country, the element of beauty is playing an increasingly important part. For example, in our homes, what wonderful transformations can be accomplished by the beauty of electrical fixtures. Their harmony of color and design, and the suggestiveness of their arrangement can be made to satisfy the most aesthetic temperament, and actually enhance the moral and social tone of the home. What wonderful things too can be done with electrical labor-saving appliances. How they lend themselves to cleanliness, orderliness, beauty and dignity in the performing of the more menial tasks in the home, and yet behind it all is the immeasurable, inexhaustible force of electricity!

In our offices, factories, etc., how much dignity and beauty has been added to toil by the application of electricity, resulting in more healthful surroundings, and protection against accidents. We do not think the average electrical dealer is conscious enough of the selling power inherent in the idea of beauty. Who is there who does not respond to beauty—in any form. We are all lovers of beauty, and the electrical dealer is fortunate above his fellow retailers in having something to offer, the very nature of which embodies the beautiful. The most beautiful window display should be that of an electrical dealer. In the field of advertising the same is true. There should be no more beautiful and appealing advertising than that of the electrical industry. This truth ought to be realized by all branches of the industry, manufacturer, jobber, central station, as well as dealer. Those who take the trouble to think it out and make a few comparisons, will perhaps be surprised to find that the most successful companies and individuals in the industry to-day are those who have exploited this idea of beauty and utility, in display and advertising electrical apparatus and appliances. As an example of this there has come to our attention a booklet distributed by the Canadian General Electric Co., Ltd. This booklet is bound in an artistically designed cover, and is of good stock paper. The first few pages contain a volume of the address by the president of the company, Lieut.-Col. The Honorable



A view of the display and demonstration rooms in the extension recently completed by the Canadian General Electric Company to their buildings at Simcoe & King Streets, Toronto.

This company pays very particular attention to the display of their goods. This is a "Merry Christmas" layout showing a corner in their new merchandising rooms—Canadian General Electric Company.



A feature of the new C. G. E. building is the club room shown to the left. This is fitted up with every accommodation that could add to the comfort of the customer — more particularly from out of town.

Frederic Nicholls. The rest of the booklet is taken up with descriptions and photographs of the club room, electric supply room, automotive supply room, etc., photographs of which are shown here. This club room has just been opened by the Canadian General Electric Company for the benefit of its out-of-town patrons, when visiting the city. The facilities of the club room include desks and writing materials, telephones, parcel lockers, and the services of a trained stenographer. The electrical supply room, automotive room and window displays of the company are studied pieces of merchandising art, and are worthy of emulation. The motto of this company is "better service," and from these photographs it will be noted that beauty of form and arrangement are the outstanding features. Get this combination into your display and advertising, Mr. Dealer. It will pay you one hundred per cent. profit on the investment.

Going East to Attend Convention

Called East to the 2nd Annual Convention of District Sales managers and dealers of the Hoover Suction Sweeper Company of Canada Limited, Mr. D. C. Gleeson, district sales manager for Alberta and British Columbia, left Vancouver city January 11th. His plans include working his territory en route; visiting his family at St. Louis; attending a sales course at the company's U.S. plant at North Canton, Ohio, and then going through to Hamilton, Ontario, for the convention. When the convention closes Mr. Gleeson intends to pay a flying trip to New York, returning to the Coast about March 1.

A Coincidence in Names

An item appeared in the December 15th issue of the Electrical News describing the "Midget" electric iron, and crediting this apparatus to the Northern Electric Company. This referred to the Northern Electric Company of Chicago, but by an oversight the address was omitted. There is no connection between this company and the Northern Electric Co., Ltd., with head office at Montreal and branches throughout Canada.

The Dominion Engineering and Machinery Company, Ltd., Lachine, P.Q., have in hand contracts for two 20,000 h.p. turbines for the Laurentide Power Company; two 10,800 h.p. and one 1,500 h.p. turbines for the Cedars plant of the Montreal Light, Heat & Power Company, and four 2,700 h.p. turbines for the Spruce Falls Co., Limited.

A Pair of Very Attractive Windows Recently Shown by Lyons Electric Co. of Brantford

The Lyons Electric Company, general electric contractors, Brantford, Ont., at our request, very kindly had photographs taken of a very splendid window display they recently put on, and we reproduce them herewith. The revolving platform in the one window is constructed of three layers of $\frac{7}{8}$ in. wood, glued together crossing the grain, and out of this a wheel was turned 54" in diameter, and mounted on a heavy cast iron platform about 15" in diameter which ran on ball bearings. The core shaft extended through a pedestal to a pulley in the basement ceiling clamped to the shaft, which travelled at half a revolution per minute, being geared down through two sets of worm gears driven by a $\frac{1}{4}$ h.p. The whole thing cost about \$150.00. On top of this revolving platform, by the use of tripods and short pieces of pipe, other circles of smaller diameter and varying heights are supported. In this way they obtained an endless variety of attractive moving effects.

Around the outside of the wheel, using miniature base receptacles, and the eight-in-series Xmas tree lamps (only they put eleven in a series, so they wouldn't burn out so fast) were three series of lights changing the colors and patterns. Three duplex flush receptacles were mounted near the circumference and the whole thing wired in to a substantial brush and commutator. Two men or a heavy range or washing machine can easily be taken care of, and while \$150.00 may seem quite a sum Mr. Lyons feels that the advertising value of the windows and the display capacity is equal to that of a window three times the size.

Another commutator divided in three sections acted as a flasher for three groups of lights, one red, one green and one white group, to flash and illuminate, changing every fifteen seconds, the goods displayed in the other window. This other window was simply constructed of boards with corner steps surmounted by a box covered with red paper, white striped, to represent a chimney out of which a Santa Claus, not shown in the photo, was coming. This window at the floor line of the steps had two openings in and out of which ran an electric train outfit bearing various legends.

The taxpayers of Montreal West, P.Q., have approved a by-law authorizing a new lighting system, with underground conduits, at an estimated cost of \$175,000.



A pair of handsome windows by Lyons Electric, Brantford—For description see article above.



A Hoover window recently shown by the British Columbia Electric Railway Co., Vancouver. The "West" is doing some very effective merchandising these days.

A Well-planned Coast Display

The British Columbia Electric Railway Company stage some very attractive displays from time to time, one of which was recently given over to the Hoover suction sweeper. Picture of this demonstration is shown herewith. We understand the Hoover Suction Sweeper Company recently initiated a window contest and that this window is one of those competing for the prize.

A Contractor Employs a Merchandising Specialist

The photograph shown here is that of the Campbell Electric Company's store window at 1479 Yonge Street, Toronto. It is interesting because it represents progress. It is not large, and there may be some things about it that might be improved, but it is full of promise. Mr. P. G. Campbell, the proprietor, is a Scot, and while this is his first venture in electrical merchandising, he has gone about it with a care and shrewdness worthy of his race. He knows the contracting end of the electrical business thoroughly, having been "apprenticed" to it in his native land, and has followed that calling steadily for fourteen years. Before opening his store Mr. Campbell made a careful survey of

the city with a view to finding the "geographical spot" for an electrical store, and after taking everything into consideration decided on his present location. The results after three months' trial have been such that he is having difficulty in handling the business from his present quarters, and is planning additional facilities to handle the ever-growing trade. He has been fortunate in securing the services of Mr. J. Wilson as manager. Mr. Wilson—who is also a native of Scotland—has had many years' experience in business management, and will concentrate his efforts on the management of the merchandizing and accounting end of the business, for, as Mr. Campbell says, "it is impossible for one man to attend to contracting and merchandising and do it successfully." Mr. Campbell has built up a good contracting connection and is kept busy attending to its demands and supervising his staff of wiremen. The Campbell Electric Company issue a neat card bearing their name, address and telephone number, and announcing their facilities for doing electrical contracting and repairs, and adding that "all work is guaranteed." The company, in their store, carry a complete stock of modern fixtures, appliances and electrical accessories, and the motto behind their business is "quality first." If this ideal is maintained, and other things being equal, the success of the business is assured.

Mr. Campbell, Campbell Electric Co., believes in specializing. He understands contracting but when it comes to merchandising he says "that's not in my line. I'll employ a specialist."



Conference of C.P.R. Telegraph Officers

On January 7th and 8th, a conference of telegraph officers of the Canadian Pacific Railway Telegraph Company was held at Montreal. Different matters were discussed relating to work which will be undertaken this year. The meetings were of a "Get together" kind—co-operation between representatives at all central points for the fast handling of telegraph business being urged.

The following officers were present: Messrs. J. McMillan, manager of telegraph, Montreal; W. J. Camp, assistant manager of telegraph, Montreal; J. Mitchell, superintendent of traffic, east lines, Montreal; E. L. Scott, superintendent of traffic, west lines, Winnipeg; A. C. Fraser, superintendent of telegraph, St. John, N.B.; W. M. Thompson, superintendent of telegraph, Montreal; W. D. Neil, superintendent of telegraph, Toronto; D. H. Bowen, superintendent of telegraph, Sudbury; A. Malcolm, inspector of telegraph, Montreal; S. L. Elliot, inspector of telegraph, Montreal; Robert Murray, chief clerk, Montreal; J. P. Griffith, agent, St. John, N.B.; D. H. Barclay, agent, Quebec; G. W. Bancroft, agent; C. W. Graham, assistant agent; W. H. Brunini, manager of Board of Trade branch, Montreal; F. Corcoran, Manager of Bank branch, Montreal; R. G. Martin, Manager of uptown branch, Montreal; C. W. MacDonald, chief operator, Montreal; T. H. Holmes, agent, Ottawa; Geo. Paton, agent, Toronto; J. H. Lahey, agent, Hamilton; G. A. Coates, agent, London; and J. C. Johnston, agent, Sault Ste. Marie.

French Building Powerful Radio Station

Construction work has been commenced by the French Government on what is designed to be the most powerful radio station in the world. The corner stone was laid at Sainte Assise recently by Loris Deschamps, Under-Secretary of State for Posts and Telegraphs. The station will be capable of transmitting, with two sending instruments, 24,000 words hourly, or receiving and deciphering simultaneously 60,000 words hourly on five instruments. The alternating system will be used. The Lafayette station, which is at present the most powerful, has a maximum range of 15,000 miles, but experience has shown that it cannot be depended upon for more than 4,500 miles regularly. The Sainte Assise station, when completed in 1923, will, it is calculated, work easily and regularly with all stations around the world. The station will be erected for the Compagnie Generale Telegraphie Sansfil. Thirty per cent. of the capital invested in the company is British and seventy per cent. French, the French Cable Company holding twenty per cent. of the total capital. The company has a working agreement with the American Radio Corporation. The plant will include sixteen steel towers 820 feet high. A number of special telegraph wires will connect the station with the Central Telegraph offices.

Showing Marine Specialties

The Ward Leonard Electric Company, a pioneer in the development of control apparatus for electrical equipment such as motors, batteries, wireless outfits and search-lamps, is showing a few of its marine specialties at the National Marine Exposition. One of the interesting features of the exhibit is a complete battery charging outfit installed in such a way as to permit demonstration of the various conditions that may be met in practice, such as overload, under-load, and no-voltage. By providing means for producing these conditions, it is possible to illustrate the performance of the equipment and to demonstrate its action in protecting the battery and charging circuits. On panel boards are mounted an assortment of rheostats and resistor units showing various typical assemblies of their standard units.

Another interesting feature of this exhibit is a light dim-

ming rheostat made up of three banks of Vitrohm dimmer units, so arranged that they can be controlled separately or in groups. This dimming equipment is connected to electric signs in the booth and serves as a means of demonstrating how such dimmers can be operated, either in individual groups or any combination of groups.

Ironing Machine with Special Features

The Utensio ironing machine is shown herewith. This machine occupies less space than the average ironing machine because the roll is only 24 inches long. It will be noticed also from the picture that the roll has an open end by which



that is, dresses and frills that could not be handled so easily with another type of machine. It is true this machine would not be so fast in the handling of large pieces, such as sheets or tablecloths, but as this kind of work constitutes a small percentage of the weekly ironing in the average home it is not thought to be a serious objection.



Mr. J. J. Shapton, appointed Sales Manager, Canadian Electric Apparatus Co.

CADMIUM-COPPER WIRE

— THE WIRE FOR WEAR —

During the War the whole of our output of Cadmium-Copper Wire was taken by the European Governments for War purposes.

We are now once more in a position to supply the requirements of our customers for this well-known wire in all sizes for Trolley Wire, Transmission Lines, Telegraph Wire, &c.

CONDUCTIVITY 7% TO 10% LESS } THAN HARD DRAWN COPPER
TENSILE STRENGTH 10% TO 75% GREATER }
According to size of wire.

As an Asset Cadmium-Copper has the same Scrap Value as Electrolytic Copper.

TROLLEY WIRE

is manufactured by us in

**ROUND,
GROOVED,
NON-FOULING,
SPECIAL SECTIONS**

and has been supplied by us to the principal Street Railway Systems of the Dominion. The following Report was received by us from the Superintendent of one of the largest systems:—

"On May 8th, 1919, we strung the outside curve with a sample of this wire. The opposite curve in the same direction had been strung with ordinary trolley wire a very short time previous.

"On December 21st both curves were measured with a micrometer. This would give each curve 228 days' service, and taking 365 mils as the diameter of a 2/0 wire, we found that the maximum wear at any point on the cadmium wire was 20 mils, while the maximum wear at any one point on the ordinary copper wire was 60 mils. The average wear on the cadmium wire was 5 mils, and on the copper wire about 20 mils.

"At the above rate of wear the cadmium curve should last between two and three times longer than the other curve."

SERVICE COUNTS

Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889

Head Office and Factories

- MONTREAL

Current Notes

Brantford, Ont.

It is planned to expend \$70,000 to double the capacity of the Brantford Hydro-electric system, according to Superintendent Caton. At present the maximum capacity is 4,500 h.p., and this load has been found inadequate. It is felt that 10,000 h.p. will not be excessive, and the new development is to provide to this end.

Messrs. T. J. Minnes & Co., 9 King St., Brantford, have been awarded the contract for electrical work on \$12,000 addition being built at 135 Colborne Street by the Gay Stores, Ltd., of Montreal.

Halifax, N.S.

It is announced that the Maritime Telegraph & Telephone Co., Ltd., has sold to Harris, Forbes & Co., Inc., of Montreal and Toronto, and the Royal Securities, Ltd., \$500,000 25-year 7 per cent. refunding mortgage gold bonds. The issue will shortly be offered on the Canadian market.

Lindsay, Ont.

The Hydro-electric Power Commission, Kent Street, Lindsay, has been awarded the contract for electrical work on \$17,000 church being erected on Wellington Street by the Queen Street Methodist congregation.

London, Ont.

The London City Council recently passed a resolution approving the scheme to electrify the London, Huron & Bruce Railway, and appointed a committee composed of Ald. J. G. Wilson, Ald. J. H. Harley and Ald. G. B. Drake to arrange for a co-operative movement with the municipal councils and other bodies concerned.

Mr. J. H. Pollock, 397 Clarence St., London, has been awarded the contract for electrical work on alterations to warehouse of the Elliott Marr Co., on York Street.

Montreal, Que.

The annual meeting of the shareholders of the Montreal Telegraph Company was held recently. In the absence of the president, Mr. Wm. McMaster, Mr. R. MacD. Paterson occupied the chair. The annual report showed total assets of \$2,315,487, of which \$163,663 was made up of cash, accounts receivable, bonds and other securities, and the balance in telegraph lines, cables, office equipment and real estate in Canada and the United States. Dividends of \$160,000 were paid during the year. The company continues free from debt and encumbrance of any kind. The company's property was taken over in 1881 by the Great Northwestern Telegraph Co. of Canada (now controlled by the Dominion Government and operated with and under the management of the Canadian National Railway System). The agreement provides for the operation and maintenance of the property by the lessor, as well as payment of dividends.

Mr. J. A. St. Amour, 2171 St. Denis Street, Montreal, has been awarded the contract for electrical work on \$35,000 bank being erected at Roy & City Hall Avenues for the Banque Provinciale du Canada.

Ottawa, Ont.

Mr. J. A. Ellacott, Bank Street, has been awarded the contract for electrical work on \$10,000 garage being erected on Queen Street.

Outremont, Que.

Mr. J. J. Valois, 444 Durocher Street, Outremont, has been awarded the contract for electrical work on 13 houses being erected at Outremont at an approximate cost of \$45,000.

Owen Sound, Ont.

The number of telephones in use in Owen Sound is

on the increase, according to figures for the year ending December 31st, 1920, showing a total of 1,431, against 1,240 on December 31st, 1919, a gain of 191, or approximately 15½ per cent. The first twelve days in January, 1921, show a further increase of 14 phones. The gain for 1920 surpassed even the expectations of Mr. W. P. Harris, the local manager for the Bell Telephone Company.

Toronto, Ont.

Mr. Norman McLeod, 808 Danforth Ave., Toronto, has been awarded the contract for electrical work on two \$7,000 residences being erected on Broadview Avenue by Mr. Alex. Grant.

A large-sized and attractive calendar has been sent out by the National Conduit Co., Ltd., of Toronto, to their patrons, advertising their well-known Xceladuct.

Messrs. Richardson & Cross have been awarded the contract for wiring the Imperial Oil Company's gasoline station at the corner of St. Clair and Westmount Avenues. The construction of the station is in charge of the John V. Gray Construction Company.

The Standard Electric Company, 668 Bloor West, have prepared a very attractive calendar for 1921, which they are distributing over the counter to their patrons. Mr. Bennett, the proprietor, who is a firm believer in the kind of advertising that is on the job 365 days in the year, has also prepared a very neat and artistic calendar novelty, with a permacolor thermometer attached to it, which he is mailing to builders and architects in his neighborhood, as an ever-ready reminder that he does electric contracting.

Winnipeg, Man.

The Star Electric Co., 191 Portage Avenue, Winnipeg, has been awarded the contract for electrical work on \$89,000 alterations to store in the Paris Building, Winnipeg.

WE INVITE YOU

TO MAKE FULL USE OF
OUR EXPERIENCE AND
ASSISTANCE IN THE USE
OF



ALUMINIUM

FOR OVERHEAD TRANS-
MISSION CONDUCTORS,
REACTANCE COILS,
TERMINALS, BUSBARS,
BATTERY CONNECTIONS,
METER CASES, ETC.

The British Aluminium Co., Ltd.
of London, England

Canadian Office:
263-267 Adelaide
St., West, Toronto



Eastern Agents:
Spielman Agencies
Montreal

APPARATUS IN WINDSOR STOCK

Direct Current Generators

Quantity	K.W.	Volts	R.P.M.	Makers	price each
1	1/2	60	1720	Lincoln, new	\$ 95.00
1	1/2	7	1750	Lincoln	55.00
1	1/2	45	1500	Lincoln	110.00
1	3/4	110	2000	General Electric	125.00
1	1 1/4	125	3400	Robbins & Meyers	75.00
1	1 1/2	110	1750	Lincoln	95.00

Single Phase, 25 Cycle Motors

Quantity	H.P.	Volts	R.P.M.	Makers	price each
4	1/8	110	1450	Menominee, new	\$ 37.50
1	1/6	110	1450	Emerson, new	40.00
X 2	1/6	110	1450	Robbins & Meyers, new	45.00
X 5	1/6	110	1450	General Electric, new	45.00
4	1/4	110	1450	Crocker Wheeler, new	45.00
31	1/4	110	1450	Menominee, new	45.00
1	1/4	110	1450	Westinghouse, new	45.00
1	1/4	110	1450	Westinghouse, used	30.00
2	1/4	110	1450	St. Louis, new	45.00
1	1/4	110-220	1450	Century, new	97.00
2	1/4	110-220	1450	Century, used	80.00
X 1	1/3	110	1450	General Electric, new	45.00
1	1/3	110	1450	Westinghouse, new	45.00
X 2	1/2	110	1450	St. Louis, new	100.00
1	1/2	110	1450	St. Louis, used	80.00
X 1	1/2	110	1450	Fort Wayne, used	65.00
X 1	1	110-220	1450	Peerless, new	185.00
X 7	1 1/2	220	1450	St. Louis, new	165.00
X 6	2	110-220	1450	Peerless, new	261.00
1	2	110-220	1450	Century, new	231.00

Three Phase, 25 Cycle, 550 Volt Motors

Quantity	H.P.	R.P.M.	Motor Only	Makers	price each
43	1	1400	" "	Can. West.	135.00
5	3	1400	" "	Can. Westg.	175.00
7	7 1/2	720	" "	Can. Westg.	325.00
2	10	1445	" "	Gen. Electric	290.00
2	10	750	" "	Gen. Electric	335.00
11	10	1500	" "	Can. Westg.	290.00
30	15	1500	" "	Can. Westg.	360.00
2	20	1500	" "	Can. Westg.	400.00
2	20	720	" "	Can. Westg.	450.00
4	25	720	" "	Can. Westg.	525.00
2	30	1400	" "	Can. Westg.	500.00
2	35	725	" "	Can. Westg.	650.00
1	50	720	" "	Can. Westg.	925.00

The above prices on 3 phase, 25 cycle, 550 volt motors are special bargain prices while they last.

Prices are for motors only and do not include base, compensator, or pulley. Motors are all new and have never been installed.

60 Cycle Motors, 1 Phase & Three Phase

Quantity	H.P.	Phase	Volts	R.P.M.	Makers	price each
1	1/6	single	110	1800	Republic, used	\$ 25.00
2	1/6	single	110	1800	Westg., used	25.00
2	1/6	single	110	1800	Gen. Elec., new	45.00
1	1/8	three	220	850	Westg., used	25.00
1	1	three	220	1750	Gen. Elec., used	75.00
1	7 1/2	three	220	1800	Gen. Elec.	225.00
1	10	three	220	1750	Fair-Morse, used	275.00

3 Phase, 25 Cycle, 220 Volt Motors

Quantity	H.P.	Volts	R.P.M.	Makers	price each
X 1	2	220	1450	St. Louis, new	\$165.00
X 3	2	220	1450	Westinghouse, new	195.00
6	2	220	1450	Crocker Wheeler, new	195.00
1	2	220	1450	Gen. Electric, used	155.00
X 4	3	220	1450	St. Louis, new	190.00
4	3	220	1450	Crocker Wheeler, new	227.00
X 1	3	220	1450	Robbins & Meyers, new	227.00
X 1	3	220	750	Gen. Electric, new	258.00
3	5	220	1450	Crocker Wheeler, new	268.00
2	5	220	1450	Robbins & Meyers, used	190.00
1	7 1/2	220	1450	Westinghouse, used	400.00
1	7 1/2	220	1450	Century, new	485.00
6	7 1/2	220	1450	Crocker Wheeler, new	485.00
2	10	220	1450	Gen. Electric, used	410.00
2	15	220	750	Crocker Wheeler, new	713.00

3 Phase 25 Cycle, 550 Volt Motors

Quantity	H.P.	Volts	R.P.M.	Makers	price each
X 1	2	550	1450	St. Louis, new	165.00
X 2	2	550	1450	Crocker Wheeler, new	195.00
X 1	2	550	1450	Robbins & Meyers, new	160.00
X 3	3	550	1450	St. Louis, new	190.00
1	3	550	1450	Crocker Wheeler, used	175.00
X 3	5	550	1450	Crocker Wheeler, new	268.00
4	5	550	1450	Gen. Electric, used	215.00
1	5	550	1450	Crocker Wheeler, used	200.00
1	5	550	1450	Gen. Electric, used	215.00
X 2	5	550	1450	St. Louis, new	240.00
X 2	5	550	750	St. Louis, new	265.00
3	7 1/2	550	1450	Gen. Electric, used	385.00
X 2	7 1/2	550	1450	Crocker Wheeler, new	485.00
3	10	550	1450	Gen. Electric, used	415.00
X 2	10	550	750	Crocker Wheeler, used	580.00
X 1	15	550	750	Allis-Chalmers, used	560.00
X 1	15	550	750	Crocker Wheeler, used	713.00
X 1	20	550	750	Crocker Wheeler, used	797.00
1	30	550	750	Crocker Wheeler, used	725.00
1	30	550	750	Gen. Electric, used	575.00
2	40	550	750	Gen. Electric, used	925.00
1	75	550	750	Gen. Electric, used	1275.00
1	100	550	750	Gen. Electric, used	1850.00

Miscellaneous

1—WAGNER ROTARY CONVERTER, 50 am., 70 volts, for use on single phase, 25 cycle, 220 volts, circuit	\$800.00
1—50 Gal. per minute GOULD CENTRIFUGAL PUMP, 1800 R.P.M.	35.00
1—BATTERY CHARGING MOTOR GENERATOR SET, 30 volt, 10 amp., D.C. and 110 volt, 25 cycle	250.00
1—80 Gallon per hour, motor driven automatic HOUSE PUMP with 25 cycle, 110 volt, motor complete with 42 gal tank, fittings, and gauge, new	295.00
1—Ditto above without Tank	190.00
2—Air Compressors for Garage Service, no motors, each	25.00

McNaughton, McKay Electric Co., Limited
115 SANDWICH ST. W. WINDSOR, ONT.

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

WANTED—D. C. 220 volt motors, any horse-power up to 25

THE KAUFMAN RUBBER CO., LIMITED,
23-3 Kitchener, Ont.

For Sale

Canadian patent rights for Rubber Article universally used in the electrical trade, in the United States. Apply Box 457 Electrical News, Toronto. 3

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1. Walter Clinton, Welland, Ont. 22-3

Reliable Manufacturers. Agents in Vancouver are desirous of adding some strong agencies for electrical equipment or specialties to their list. We would like to hear from any manufacturer who is desirous of placing his product in British Columbia. Electrical News, Box 88, 212 Winch Bldg., Vancouver. 3-6

Motors for Sale

Large stock of 25 cycle and 60 cycle Motors, consisting of Westinghouse, Crocker-Wheeler and C. G. E. makes. Motors purchased from American Government and have seen little or no use. Attractive prices.

Apply—L. S. Tarshis & Sons,
400 Front St. East, Toronto, Ont. 2-5

Motors For Sale

1, 15 h.p.; 1, 10 h.p.; 1, 5 h.p., 3 P., 220 V., 25 C.; 1, 2 h.p.; 3 P., 550 V., 25 C.; 1, ¼ S. P. 110 V., 25 C., new. All motors are good.

3 Wm. R. Mauthe,
Simcoe, Ont.

Engine and Generator Sets For Sale

Used Engine and Generator Sets, in excellent condition—1—400 k.w. alternating current Generator (Canadian General Electric Co.'s make), 40 phase, 60 cycle, 600 volts, directly connected to one (1) 22 in. and 38 in. x 24 in. Robb Armstrong Cross Compound Corliss Engine at 150 r.p.m. 1—200 k.w. direct current (Canadian Westinghouse), 220 volt, compound wound, 380 r.p.m., directly connected to a Bellis & Morcom vertical 2 crank compound self-lubricating engine. Veates Machinery & Supply Co., Ltd., Montreal, Que. 3

Draftsmen Wanted

Several permanent positions open for Experienced Electrical Station Layout Designing Draftsmen. Preference given to Technical Graduates. Apply Employees Relations Department, Hydro-Electric Power Commission of Ontario, 190 University Avenue, Toronto,

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT Positions Desired and Vacant

ELECTRICAL ENGINEER, college graduate, ten years' experience lighting, power maintenance and electrolytic gas making, would like position as assistant engineer or to take charge of small plant. Best references. Box 450, Electrical News, Toronto. 2-3

Electrician, wireman, good all-round man: would like a change, permanency preferred, conduit knob and tubes, casing, motors, telephones and alarms, new and old, work, plans and estimating; also good general mechanical experience; 25 years' British and Canadian experience; age 39; married. A. F. Hodges, 424 11th St., Medicine Hat, Alberta. 3-4

Manufacturers' Agents in Vancouver, B. C.

desires Agency Propositions on Electrical Specialties of proven merit. References on request. Box 66, Electrical News, 212 Winch Bldg., Vancouver, B. C. 2-3

Wisconsin Doing Much Highway Bridge Work

During 1920 a large amount of highway bridge construction was initiated in Wisconsin under supervision of the State Highway Department. Plans were prepared by the department for 540 bridges, totaling in length 15,315 ft., and to cost 2¼ million dollars. About half the total represents state-aid work, and only about one-seventh Federal-aid work, the remainder being county construction. The figures given cover only the first three quarters of the year.

A million-dollar corporation of Pittsburghers to develop industrial lines in Palestine is being organized by members of the Zionist Organization. Industries to be developed include glass, foundries, limestone, brick and machinery.

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-c

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Make
Used 1	100	3	25	550	710	Wagner	
" 1	75	3	25	550	480	West.	
" 1	60	3	25	550	750	Cr. W.	
New 2	52	3	25	550	720	Lanc.	
Used 1	50	3	60	550	600	C.G.E.	
" 1	50	3	60	550	970	Westg.	
" 2	50	3	25	550	720	Westg.	
New 2	35	3	25	550	720	Westg.	
Used 1	30	3	25	550	1500	Tor. & H.	
" 2	30	3	25	550	720	Westg.	
" 1	25	3	60	220	720	Cr. W.	
" 1	15	3	25	550	1450	Westg.	
New 1	15	3	25	550	1400	Lanc.	
" 1	15	3	25	550	750	Lincoln	
" 6	15	3	25	550	720	Westg.	
" 2	10	3	25	550	720	Westg.	
Used 1	7½	3	25	220	1500	Tor. & H.	
" 1	7½	3	25	550	1450	C.G.E.	
" 1	7½	3	25	550	700	Lanc.	
New 1	7½	3	25	550	725	Westg.	
" 1	5	3	25	550	1440	Excelsior	
" 1	5	3	25	550	710	Wagner	
Used 1	5	3	60	200	1725	Westg.	
New 3	3	3	25	550	1500	Lanc.	
" 5	3	3	25	550	1400	Westg.	
" 4	3	3	25	550	1400	Excelsior	
" 2	2	3	25	550	1440	Excelsior	
" 2	2	3	25	550	1425	Lanc.	
" 2	2	3	25	1500	1500	Lanc.	
" 3	2	1	25	110	1440	Wagner	
" 1	1½	1	25	110	1440	Wagner	
" 1	1½	1	25	110	1420	Wagner	
Used 1	1	3	25	220	1500	Tor. & H.	
New 1	1	1	25	110	1440	Wagner	
" 1	1	3	25	550	1425	Lanc.	

Write for Prices

H. W. PETRIE, Limited

131 Front St. West Toronto Ont.

You Should Know

as much about contemplated projects as your competitor does. Keep fully informed by means of the verified news of

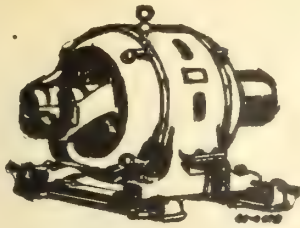
Building and Engineering

contracts obtainable through the use of MacLean Daily Reports. These reports give you the most authoritative information as to every project, enabling your salesman to concentrate on the prospects. We are sending hundreds of the more aggressive business every year—why not you?

Write for full information

MacLean Building Reports, Limited,
345 Adelaide St. West, Toronto

MacLean REPORTS



Machines In Our Montreal Stock

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new "Kuhlman" Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately three to four weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.
1—300 H.P. 300 RPM.
2—300 H.P. 490 RPM.
1—100 H.P. 600 RPM.
2—75 H.P. 1200 RPM.

3 Phase 60 Cycle 550 Volt.
2—200 H.P. 600 RPM. Slip Ring.
1—100 H.P. 600 RPM. Slip Ring.
1—100 H.P. 600 RPM.
2—75 H.P. 900 RPM.
1—50 H.P. 900 RPM. Slip Ring.
4—50 H.P. 900 RPM.
3—50 H.P. 1200 RPM.
2—40 H.P. 1200 RPM.
4—35 H.P. 1200 RPM.
1—35 H.P. 1800 RPM.
4—35 H.P. 900 RPM.
1—35 H.P. 600 RPM.
3—30 H.P. 1200 RPM.
2—30 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—25 H.P. 1200 RPM.
1—20 H.P. 900 RPM.
2—15 H.P. 900 RPM.
1—15 H.P. 1200 RPM.
1—10 H.P. 1800 RPM.
2—10 H.P. 1200 RPM.
3—10 H.P. 720 RPM.
1—8 H.P. 810 RPM. Crane
2—7½ H.P. 900 RPM.
7—7½ H.P. 1200 RPM.
2—7½ H.P. 1800 RPM.
3—5 H.P. 900 RPM.

3—5 H.P. 1200 RPM.
14—5 H.P. 1800 RPM.
1—4 H.P. 1140 RPM. Crane
22—3 H.P. 1800 RPM.
12—3 H.P. 1200 RPM.
15—2 H.P. 1800 RPM.
14—2 H.P. 1200 RPM.

3 Phase 60 Cycle 440 Volt
2—50 H.P. 900 RPM.
8—30 H.P. 900 RPM.
2—30 H.P. 850 RPM.

Single Phase 30 Cycle 110/220 Volt
2—1/8 H.P. 1415 RPM.
1—1/6 H.P. 1425 RPM.
2—1/6 H.P. 1750 RPM.
1—1/2 H.P. 1420 RPM.

8 Phase 60 Cycle 220 Volt.
1—75 H.P. 900 RPM.
1—60 H.P. 900 RPM.
2—50 H.P. 900 RPM.
2—40 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—20 H.P. 1200 RPM.
1—15 H.P. 1200 RPM.
1—15 H.P. 1150 RPM. Slip Ring
3—10 H.P. 1800 RPM.
2—7½ H.P. 1750 RPM.
3—7½ H.P. 1200 RPM.
2—5 H.P. 900 RPM.
5—5 H.P. 1200 RPM.
2—3 H.P. 1200 RPM.
1—2 H.P. 1800 RPM.

Single Phase 60 Cycle 110 Volt.
2—7½ H.P. 1800 RPM.
3—5 H.P. 1800 RPM.
10—3 H.P. 1800 RPM.
1—3 H.P. 1165 RPM.
1—2½ H.P. 1800 RPM.
11—2 H.P. 1800 RPM.
3—1 H.P. 1800 RPM.
5—3/4 H.P. 1800 RPM.
23—1/2 H.P. 1800 RPM.
15—1/3 H.P. 1800 RPM.
45—1/4 H.P. 1800 RPM.
16—1/6 H.P. 1800 RPM.
1—1/6 H.P. 1200 RPM.
5—1/8 H.P. 1800 RPM.

D. C. MOTORS & GENERATORS

1—40 H.P. 220 Volts.
1—35 H.P. 220 Volts.
1—17 H.P. 110 Volts.
1—8½ H.P. 125 Volts.
1—8 H.P. 120 Volts.
2—1/6 H.P. 32 Volts.

TRANSFORMERS

1—40 K.V.A. 2200/110 Volts.
1—30 K.V.A. 2200/110 Volts.
2—25 K.V.A. 2200/550 Volts.
2—15 K.V.A. 2200/550 Volts.
5—10 K.V.A. 2200/550 Volts.
6—7½ K.V.A. 2200/550 Volts.
5—5 K.V.A. 2200/550 Volts.
3—3 K.V.A. 2200/550 Volts.
2—2½ K.V.A. 2200/550 Volts.
2—6 K.V.A. 2200/110 Volts.

If interested in Electric Power Apparatus, phone, wire or write us.

Electric Motor and Machinery Co., Limited 417 St. James St., Montreal, Que.
Tel. Main 2177—Main 18. Night Call Rock.3523

Motors in Stock

25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
1 10 hp. C.W. 750 rev., starter, rails, pulley.
1 5 hp. C.W. 1500 rev., starter, rails, pulley.
25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
1 13 hp. Lancash. 750 rev., starter, rails, pulley.
1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
1 20 hp. T.H.E. 1200 rev., pulley rails starter.
1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
3 ½ hp. 1200 rev. clutch type T.H.E.
1 1 hp. 1800 rev. split phase Peerless.
1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
NEW SINGLE PHASE MOTORS in STOCK—REPULSION
2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
SPLIT PHASE
2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
4 ½ hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited
HAMILTON ONTARIO

SPECIALS!

3 Phase, 25 cycle, 550 volts,
720 R.P.M.

1—25 H.P. | with oil-immersed starter
1—30 H.P. | \$450.00
1—40 H.P.

3 Phase, 60 cycle, 220 volts,
1200 R.P.M.

1—20 H.P. | with oil immersed starter
1—30 H.P. | new winding--guaranteed
1—35 H.P. | \$600.00

**Industrial Engineering Co.
of Canada, Limited**

Consulting Engineers—Electrical Equipment
WINDSOR, ONT. TORONTO, ONT.
25 Royal Bank Bldg. Carlaw Bldg.



D.C. UNITS

250 VOLTS

GENERATOR			ENGINE	
K.W.	Make	RPM.	Cyl. Dimensions	Make
10	General Electric	600	4 cylinder	General Elec.
25	General Electric	300	10 x 12	Armington-Sims
30	Crocker Wheeler	300	8 x 12	Chandler-Taylor
35	Triumph	310	10 x 14	Ideal
40	Northern	350	10 x 10	Lycoming
50	Westinghouse	300	10 x 12	Buckeye
60	Crocker Wheeler	275	11 x 13	Watertown
75	Westinghouse	300	12x14x20	Westinghouse
100	General Electric	235	17 x 24	Ames
120	General Electric	280	16 x 14	Harrisburg
125	Westinghouse	200	14-1/16x22-1/16x16"	American Ball
130	Crocker Wheeler	225	Size 16	Buffalo Twin
150	Ft. Wayne	165	16 x 24	Diesel
160	Bullock	160	16 x 24	Diesel
200	Westinghouse	380	15x24x10	Belliss & Mor.
250	Westinghouse	185	15 1/2 x 25 x 21	Buckeye
300	Crocker Wheeler	125	20x40x36	McL. Seymour
375	Allis Chalmers	120	15x30x36	Putnam
400	General Electric	150	16x30x36	Rice Sargent
425	General Electric	80	22 x 48	Hamilton Corliss
500	General Electric	90	18x32x24	McL. Seymour

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Buyers and Sellers of New and Used Machinery
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Interior Telephone Systems

(Steel Cabinets)



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We Make All Styles
"A System for Every Service"
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Hustling Electrical Dealers Make Good Profit
Handling This Type of Interior
Telephone Systems

Manufactured by
CENTURY TELEPHONE CONSTRUCTION CO.
BRIDGEBURG, ONT.

Pull Chain Sockets

Highest Quality

1/8" Cap



3/8" Cap

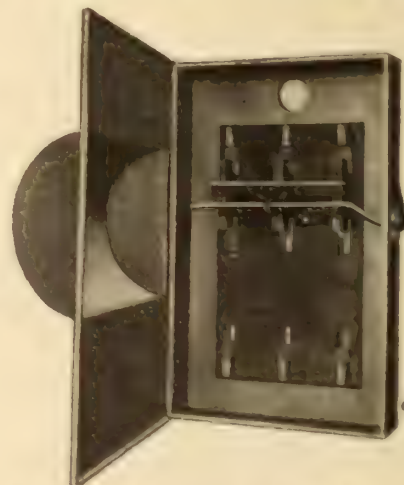
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MONTREAL, - CANADA

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Maritime Representative:
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Dominion Steel Enclosed Switches are designed for use in connection with service and industrial installations wherever it is desirable to completely enclose all terminal wiring and have made for the advancement of "Safety First" appliances. Such appliances are equipment, the prevention of tampering with circuits and the elimination of accident hazards.

Our catalogue gives full description and prices of our switches. Send for it.

Makers of all types of steel boxes and tanks also metal stampings, commercial wiring and tanning.

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Dependable Electrical Wire

Wire built under the direct supervision of experienced engineers.

We make Bare and Insulated wire and cable for every transmission purpose.

If your requirements call for Wire Rope, we can supply S.M.S. crucible, mild or extra plough steel.

CANADA WIRE & CABLE COMPANY LIMITED

TORONTO

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Halifax, N. S.

148 Beaver Hall Hill
Montreal, Que.

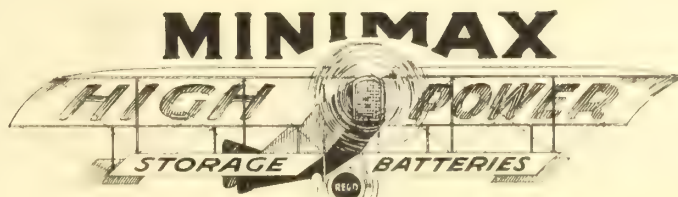
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MAISONNEUVE,

MONTREAL, QUE.

Strong and Brilliant



ELECTRIC LAMPS

Manufactured by

THE SOLEX CO., LIMITED

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MONTREAL

WINNIPEG

Aluminum Conductors

—Steel Reinforced

Aluminum cable with a core of steel realizes on the lightness and conductivity of the aluminum and the extra high strength of the steel.

Due to the increased strength and decreased weight, span lengths for transmission lines may be increased with a reduction in line costs. Usually a notable saving in poles or towers and insulators is effected.

Electrical Conductor Handbook — new edition — will be ready soon. Send us your address and we will reserve a copy for you.

Northern Aluminum Company

1307 Bank of Hamilton Bldg.

Limited

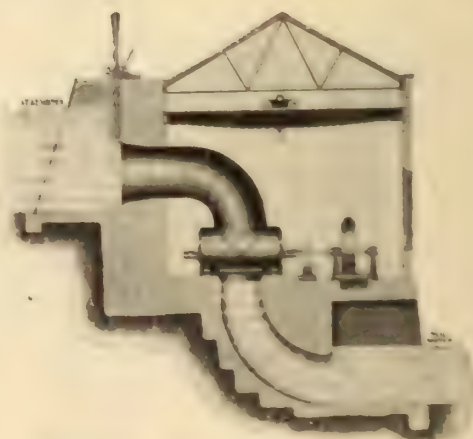
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Hydraulic Turbines

We build Hydraulic Equipment and Turbines in Canada. Backed by an experience of over sixty years in making Hydraulic Machinery, we guarantee to give satisfaction, and save you revenue charges.

Put your problem up to our engineers.

Send for our Bulletin No. 54



Horizontal Turbine Driving Generator

William Hamilton Company, Limited

PETERBORO

ONTARIO

Has Outlasted 12 Sets of Ordinary Brushes

A big argument in favor of any commodity is its ability to last a long time.

NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

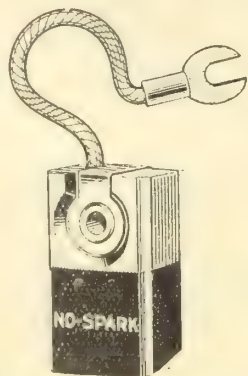
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

Send for our interesting bulletins.

**CALEBAUGH
Self-Lubricating Carbon Co.**

1503 Columbia Ave., PHILADELPHIA, PA.

Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



What do You Want the Motor for?



Wagner Single-Phase Motor Driving an Air Compressor.

Regardless of the service, if your current is alternating, there is a Wagner, Quality Motor built expressly for that purpose.

Wagner Motors
are 40° Motors

If you can buy Quality Motors will you accept the inferior? Send for Bulletins 11813 and 12213.



420 Power Bldg., Montreal.

183 George St., Toronto.
569

PEIRCE BRACKETS

Pole Line Hardware

The only licensed manufacturer in Canada of this well known high grade material is

N. SLATER COMPANY, LTD.

(Successor to Slater & Barnard, Ltd.)

HAMILTON, Ontario

Made in Canada Under Peirce and Hubbard Patents

The Amelite



Creating Prosperity

When prosperity quits chasing business, then business should chase prosperity—strenuously.

And there is no better method of catching prosperity than by effective store lighting. It is a quick sure help to merchandising success.

For store lighting the Amelite gives most for least cost. Designed for efficiency, it also combines real beauty with practical economy. For every store room there is a proper size Amelite.

Made in four different sizes,
for lamps 75 Watts to 500.

Let us send you prices.

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CORAOPOLIS, PA:

Made in Canada
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Electrical Wiring
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Labelled under supervision of Underwriters' Laboratories

XCELADUCT
(GALVANIZED)

For All
Electrical
Installations

Manufactured by
National Conduit Co., Limited
Toronto

Efficient service is the keynote of membership of the



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Canadian National Newspapers and Periodicals Association

—a highly constructive service—absolutely dependable and devoid of prejudice and personal bias. It means much to you!

The policies and principles back of this important service enable you to secure practical and impartial information of great value in business and in the home: and they assure a ready fund of literature of exceptionally high standard at all times.

To read the Association's Standards of Practice listed herewith is to understand what this Association means to you.

Standards of Practice

Canadian National Newspapers and Periodicals Association

THE Members of this Association shall dedicate their best efforts to the cause of business, and public service, and to this end shall pledge themselves:

1. To consider first the interests of the Subscriber.
2. To work for truth and honesty in all departments.
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give the maximum result from your lighting, and will pay for their small cost in saving of current. Don't fail to write for our folder on lighting efficiency.

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Pittsburgh Reflector and Illuminating Co.

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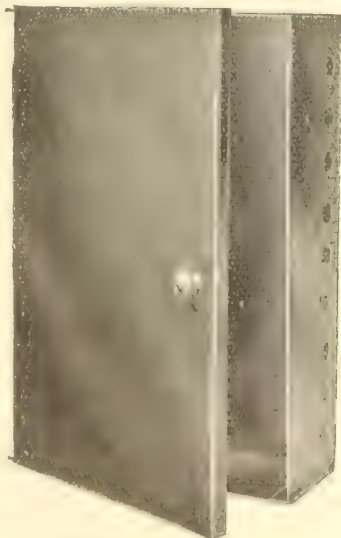
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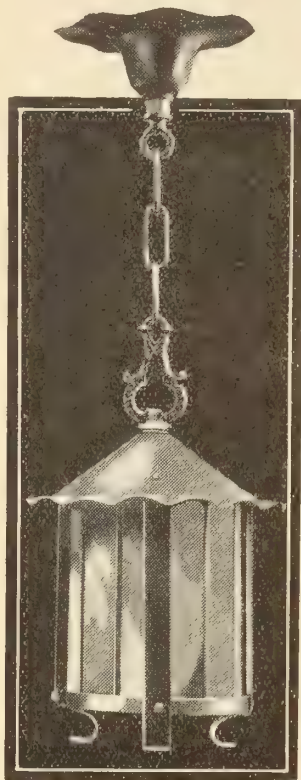


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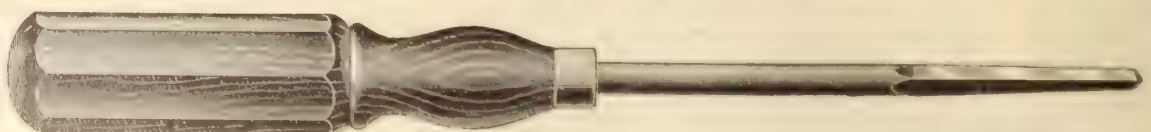


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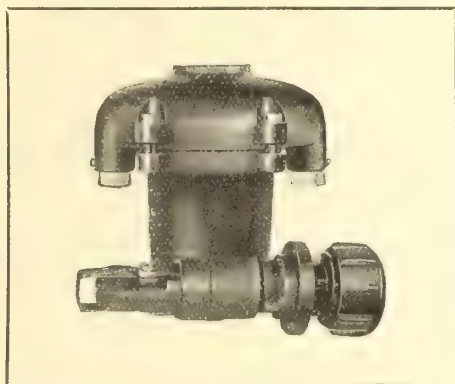
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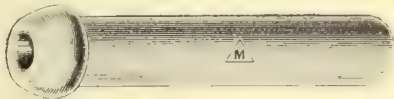
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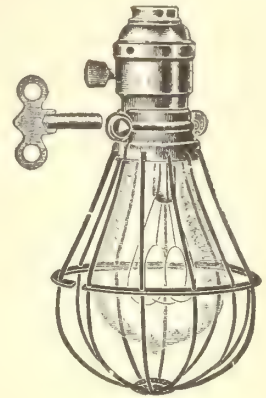
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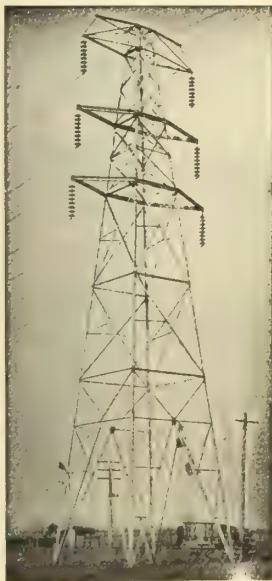


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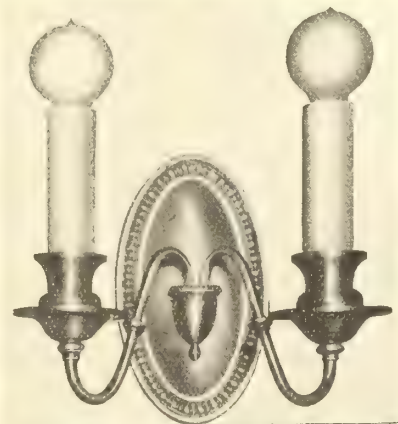
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Hatheway & Knott, Inc.
Northern Electric Company
Sangamo Electric Company of Canada, Ltd.

INSTRUMENT CUTOFF SWITCHES

Electrical Development & Machine Co.

INSTRUMENTS—RECORDING

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Northern Electric Company

INSULATION

Canadian Johns-Manville Company
Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
International Machinery & Supply Co.

INSULATION (Hard Fibre)

Diamond State Fibre Co. of Canada, Ltd.

INSULATORS

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Canadian Westinghouse Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Moloney Electric Company of Canada
Mica Company of Canada
Northern Electric Company
Ohio Brass Company

INSULATING CLOTH

Packard Electric Company

IRONS (Electric)

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Canadian Westinghouse Company
Clemens Electrical Corp. of Canada, Ltd.
National Electric Heating Company
Northern Electric Company

LAMP BULBS (Electrical)

Jefferson Glass Company

LAMPS

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Canadian National Carbon Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto
Northern Electric Company

LANTERNS (Electric)

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Duncan Electrical Company
Spielman Agencies, Registered

LIGHTNING ARRESTORS

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Moloney Electric Company of Canada
Northern Electric Company

LIGHTING PLANTS

Dominion Steel Products

LIGHT-REGULATORS

Dominion Battery Company

LINE MATERIAL

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Electric Service Supplies Company
Northern Electric Company
Ohio Brass Company
Slater, N.
Steel Company of Canada, Limited
Steel City Electric Company

LIGHTING STANDARDS

Canadian General Electric Company
Dominion Steel Products
Northern Electric Company

LOCK AERIAL RINGS

Slater, N.

MAGNETS

Canadian Westinghouse Company

MARBLE

Davis Slate & Mfg. Company

MEASURING INSTRUMENTS

Leeds Northrup Company
Northern Electric Company

METAL SPINNING

Booth-Coulter Copper & Brass Company
Edmunds & Co., J. H.

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Canadian National Carbon Company
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lincoln Electric Company
Northern Electric Company
Packard Electric Company
Sangamo Electric Company of Canada, Ltd.

MICA

Fillion, S. O.
Kent Brothers
Mica Company of Canada

MOTORS

Canadian Crocker-Wheeler Company
Canadian General Electric Company
Canadian National Carbon Company
Canadian Westinghouse Company
Century Electric Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lancashire Dynamo & Motor Company
Lincoln Electric Company
MacGovern & Company
Northern Electric Company
Petrie, Limited, H. W.
Robbins & Myers
Thomson Company, Limited, Fred.
Toronto & Hamilton Electric Company
Wagner Electric Mfg. Company of Canada

MOTOR AND GENERATOR BRUSHES

Calebaugh Self-Lubricating Carbon Co.
Dominion Carbon Brush Company

MOTOR STARTING SWITCHES

Canadian Drill & Electric Box Company

OUTDOOR SUB-STATIONS

Moloney Electric Company of Canada

OVERHEAD MATERIAL

Northern Electric Company
Ohio Brass Company

PANEL BOARDS

Benjamin Electric Manufacturing Company
Canadian General Electric Company
Canadian Krantz Manufacturing Company
Devoo Electric Switch Company
Northern Electric Company

PAINTS & COMPOUNDS

G. & W. Electric Specialty Company
McGill Manufacturing Company
Spielman Agencies, Registered
Standard Underground Cable Co. of Canada

PHOTOMETRICAL TESTING

Electric Testing Laboratories, Inc.

PATENT SOLICITORS & ATTORNEYS

Dennison, H. J. S.
Fetherstonhaugh & Hammond
Ridout & Maybee

PINS (Insulator and High Voltage)

Ohio Brass Company
Slater, N.

PIPE LINES

Boving Hydraulic & Engineering Company
Hamilton Company, Wm.

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Hatheway & Knott, Inc.

POLES

Canadian Porcelain Company
Northern Electric Company

POLE LINE HARDWARE

Northern Electric Company
Slater, N.

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Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Ohio Brass Company

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Electrical Development & Machine Co.

POST TYPE INSULATORS

Electrical Development & Machine Co.

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G. & W. Electric Specialty Company
Northern Electric Company
Standard Underground Cable Company of Canada, Limited

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Boving Hydraulic & Engineering Company
Electric Motor & Machinery Co., Ltd.
MacGovern & Company

PUMPS AND PUMPING MACHINERY

Boving & Company of Canada
Canadian Associated Companies

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Canadian General Electric Company
Diamond State Fibre Co. of Canada, Ltd.
Monarch Electric Company
Northern Electric Company
Paulding, John I.

RECORDING INSTRUMENTS

Canadian Westinghouse Company

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Benjamin Electric Mfg. Co.
Pittsburgh Refractor & Illuminating Co.

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Electrical Maintenance & Repairs Company

REPAIRS

Electrical Maintenance & Repairs Company
Electric Motor & Machinery Co., Ltd.
Thomson Company, Fred.

REVERSE PHASE RELAYS

Electrical Development & Machine Co.

RHEOSTAT BOXES AND ACCESSORIES

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ROSETTES

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Duncan Electrical Company
Northern Electric Company

SLATE

Davis Slate & Mfg. Company

SOCKETS

Benjamin Electric Manufacturing Company
Canadian General Electric Company
Duncan Electrical Company
McDonald & Willson, Ltd., Toronto
McGill Mfg. Co.
Northern Electric Company



Diamond Fibre Bushings

If you use bushings in your work, no matter what it may be, we can supply you.

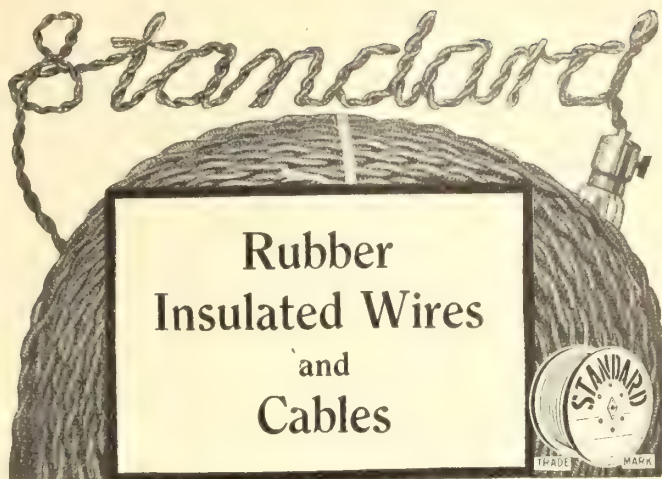
We manufacture bushings for all purposes, from the famous Diamond Fibre.

*Write to-day for information regarding
Diamond Fibre Products*



Dept. B.

Diamond State Fibre Company
of Canada, Limited
455 King Street W., Toronto, Canada



Rubber Insulated Wires and Cables

include a wide variety of types to meet every condition of service. These types include, in addition to wire for ordinary interior wiring, a complete line of special make-ups such as Brewery Cord, Theatre Cable, Elevator Cable, Tree Wire, Etc.

For complete information write our nearest office

**Standard Underground Cable Co.
of Canada, Limited**
Hamilton, Ont.

Montreal, Toronto, Seattle, Wash., Winnipeg.

Manufacturers of Bare and Insulated Electric Wires and Cables of all kinds, also Cable Terminals, Junction Boxes, etc.



SAFETY FROST

Non-injurious to the skin, non-inflammable and absolutely permanent.

Easy to apply—Simply dip into can and allow excess to drip back for two minutes, and wash off with water.

Is not affected by weather or heat of lamp. It is on to stay.

ARTS ELECTRICAL CO.
Makers

TROY, N. Y.

Carried in Stock by

W. H. Hazlett & Co., Ltd., Vancouver, B.C.
International Machinery & Supply Co., Ltd.,
421 St. James St., Montreal

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SPECIAL HEATING APPLIANCES

National Electric Heating Company
Renfrew Electric Company

STORAGE BATTERIES

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Canadian Hart Accumulator Company
Canadian National Carbon Company
Northern Electric Company

STREET LIGHTING FIXTURES

Benjamin Electric Manufacturing Company
Northern Electric Company
Winter Joyner, A. H.

SWITCHBOARD SLATE AND MARBLE

Davis Slate & Manufacturing Company

SWITCHES

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Ferranti Meter & Transformer Mfg. Co.
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Canadian Johns-Manville Company
Packard Electric Company
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Century Telephone Construction Company
Northern Electric Company

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Clemens Electrical Corp. of Canada, Ltd.
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Northern Electric Company
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Northern Electric Company

TOY TRANSFORMERS

Killark Electric Manufacturing Company

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Canadian General Electric Company
Canadian Westinghouse Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
MacGovern & Company
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Monarch Electric Company
Northern Electric Company
Packard Electric Company
Standard Transformer Company

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Canadian Bridge Company

TROLLEY GUARDS

Ohio Brass Company

TUBING

Northern Aluminum Company

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Barber & Sons, Chas.
Boving Company of Canada
Canadian Allis-Chalmers Company
Hamilton Company, Wm.
MacGovern & Company
Smith Company, S. Morgan

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Gest, Limited, G. M.
Northern Electric Company
Standard Underground Cable Co. of Canada, Ltd.

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Franke Levasseur & Co.
Hoover Suction Sweeper Co. of Canada, Ltd.
Houston & Company
McDonald & Willson, Ltd., Toronto
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VARNISHES

Standard Electric Co., Ltd.

WASHING MACHINES

Canadian General Electric Company
Hosco Machine Company
McDonald & Willson
Northern Electric Company

WATER WHEELS

Barber & Sons, Chas.

WELDING EQUIPMENT

Canadian General Electric Company

WIRE

Canadian General Electric Company
Canadian Wire & Cable Company
International Manufacturing Company
Moloney & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Electric Co., Ltd., Toronto
Standard Electric Co., Ltd., Toronto

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Canadian General Electric Company
Hatheway & Knott, Inc.
Northern Electric Company

WOOD SCREWS

Renfrew Electric Company

WRINGERS (Power)

Standard Electric Co., Ltd.



DURABLE INSULATION

The man who is having electrical installation work done insists, if he is wise, upon only the best.

The contractor realizes this and protects himself as well as his customer when he uses

BAKELITE-DILECTO

A tough, durable, waterproof insulation that is much superior to hard rubber. It is furnished in sheets, rods, tubes, and special shapes.

A real test in your plant will settle any doubt you may have. Many electrical engineers have tested Bakelite-Dilecto, and they KNOW. Our other products are Vulcanized Fibre Continental-Bakelite in sheets, rods, tubes, special shapes and Conite in sheets or rolls from .005" to .020" thick.

WRITE FOR BOOKLET AND PRICES

The Continental Fibre Co.
Newark, Del.

New York Office:
233 Broadway

Pittsburgh Office:
301 Fifth Avenue.

Los Angeles Office:
411 S. Main Street.

Chicago Office:
332 S. Michigan Ave.

San Francisco Office:
525 Market Street

Canadian Office:
Cor. King and Yonge Sts.,
Toronto, Ont.

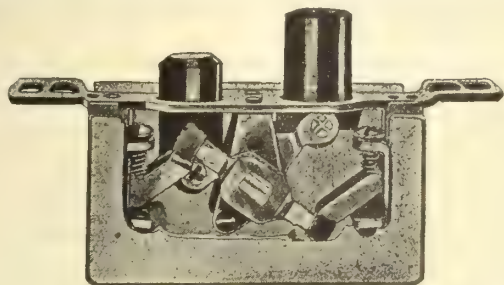
Canadian Agent

Frank T. Groome

1710 ROYAL BANK BLDG.

Toronto Phone Adel. 106

THE
New England Push Switch



Have You Seen Its Sales Possibilities Yet?

If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

Write or Phone our Canadian Agent:

FRANK T. GROOME

1710 Royal Bank Building,
Cor. King and Yonge Sts. TORONTO

Phone Ad. 106

JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.

Can You Afford?

to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine. Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.



BE FIRST

Canadian Hykon Company
55 John St. South - Hamilton, Ont.



"Just What I Want"

This is exactly what you, or any one else, will say after having bothered around with loose extension cords.

The Automatic Extension Reel
for Electric Lamps

Obviates the necessity of dragging your cord over the floor, thus wearing out insulation and breaking sockets, guards, etc. Takes your light just where you want it, locks at any point, and automatically rewinds your cord when you are through with light. Contains 25 feet of approved reinforced weatherproof cord.

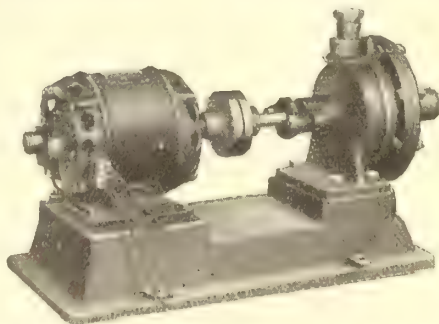
Approved by the Underwriters, and endorsed by fire and electrical bureaus everywhere. Fully protected by two basic patents and more pending. Write for further particulars and prices.

The Cincinnati Specialty Mfg. Co.
Inc.

1907-19 Powers St., West, Cincinnati, Ohio

Canadian Agents:
Richard James & Co., Regd., 88 Craig St. W., Montreal, Can.

EACH SIZE OF
Century
REPULSION START INDUCTION
SINGLE PHASE MOTORS



1/2 H. P. Motor Direct Connected to a Small Centrifugal Pump.

Ratings 1-10 to 40 H.P.

is liberally designed and correctly rated for continuous service under the unfavorable conditions encountered in their applications to such apparatus as pumps, carbonators, refrigerating machines, blowers, etc.

Century Electric Company

19th, Pine to Olive Sts., ST. LOUIS, Mo., U.S.A.

Stock carried in Canada by:
Jones & Moore Electric Co., Ltd., 294 Adelaide St. W., Toronto
Great West Electric Co., Ltd., Winnipeg
Rudel-Belnap Machinery Co., Ltd., 187 Shaughnessy Bldg.,
McGill Street, Montreal
Rankin & Cherrill, 55 Hastings St. W., Vancouver, B.C.

Westinghouse



Boosting Sales with a Beam of Heat

There are many homes that have a good use for the soft, mellow heat-ray that the Cosy Glow radiator throws off.

The Cosy Glow attracts particularly favorable attention if placed in a prominent position during the cold weather.

SERVICE

DEPENDABLE REPAIR WORK—and no other kind is tolerated by the cautious operator of electrical apparatus—is the natural result when per-

formed by factory-trained experts, supported by the engineering skill and manufacturing knowledge associated with the name—

WESTINGHOUSE

PROMPT REPAIR SERVICE has been assured to users of Westinghouse apparatus, by establishing at convenient points repair shops operated by the Company's Service Department, where repair work

is executed with all possible despatch, consistent with the care that is observed in the various processes entering into work of this character. Repair shops are located at:—

MONTREAL—10 St. Sophie Lane
TORONTO—366 Adelaide St. W.

VANCOUVER—1090 Mainland St.

WINNIPEG—158 Portage Ave. E.
CALGARY—316 Third Ave. E.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.



A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

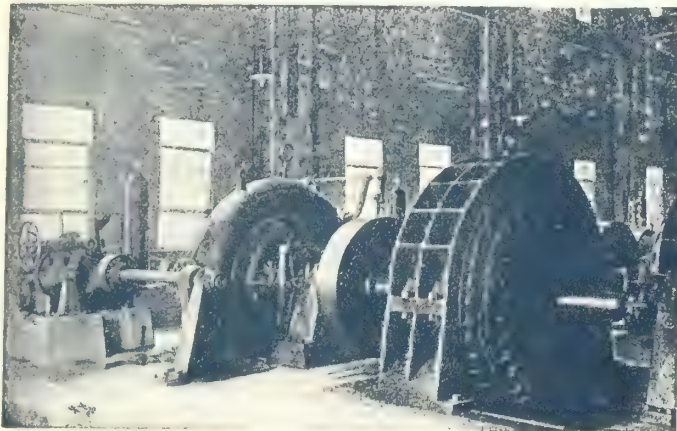
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

*Manufacturers of High and Low
Tension Porcelain Insulators*

USED ELECTRIC MOTORS

IN STOCK DECEMBER 21st

A. C. MOTORS

550 Volts, 3 Phase, 60 Cycle			
2	H.P. 1800 rpm.	Thomson	
5	" 1800 "	Thomson	
5	" 1800 "	Fairbanks	
7½	" 1800 "	Thomson	
10	" 1800 "	C. G. E.	
25	" 900 "	C.G.E.	
30	" 1200 "	C.G.E.	
40	" 1200 "	Westinghouse	
300	" 720 "	Westinghouse	

220 Volts, 3 Phase, 60 Cycle			
3	H.P. 1800 RPM.	A.C.B.	
7½	" 1800 "	A.C.B.	
10	" 1200 "	S. G. E.	
10	" 900 "	A. C. B.	
75	" 720 "	Westinghouse	
75	" 900 "	Westinghouse	
100	" 720 "	Fairbanks	

2200 Volts 3 Phase, 60 Cycle			
50	H.P. 1200 RPM.	A.C.B.	
100	" 720 "	C.G.E.	
200	" 514 "	Crocker-Wheeler	

A. C. GENERATORS

- 1—75 K.W. 2300 volt, 3 phase, 60 cycle, 900 rpm., revolving field type G. E. generator.
 1—250 K. W. 250 volt, 3 phase, 60 cycle, 600 rpm., revolving field type C.G.E. generator.

TRANSFORMERS

- 2—7½ K.V.A. 2200-220/110 volts, 60 cycle, C.G.E.
 2—200 K.V.A. 2200-220/110 volts, 60 cycle, Packard

D. C. MOTORS AND GENERATORS

110 Volts			
6	K.W. 1850 rpm.	C. G. E.	
6	H.P. 1465 RPM.	Westinghouse	
7	" 660 "	C.G.E.	
2-10	" 700 "	G. E. (crane)	
2-11	" 700 "	Westge. (crane)	
20	" 850 "	Lundell	
25	" 735 "	Bullock	
50	" 950 "	Westinghouse	
54	" 850 "	Westinghouse	

220 Volts			
20	H.P. 925 RPM.	C.G.E.	
30	K.W. 3000 "	Crocker Wheeler	
50	" 950 "	Westinghouse	
90	" 925 "	Westinghouse	
100	" 650 "	Bullock	

500 Volts			
5	H.P. 1800 RPM.	C.G.E.	
5	" 1600 "	C.G.E.	
10	" 1150 "	London	
10	" 1400 "	C.G.E.	
10	" 1000 "	A.C.B.	
25	" 950 "	Westinghouse	
30	" 700 "	Westinghouse	
50	" 825 "	Westinghouse	
60	" 1000 "	Bullock	

All the above in first-class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

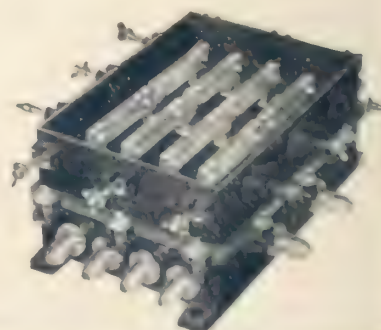
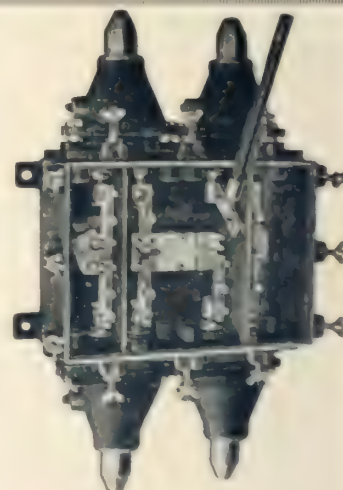
7-13 ST. GENEVIEVE STREET

MONTREAL

A VITAL POINT

Your cable ends are vital not only in the sense that they must be carefully protected but also in the sense that they are a logical point for sectionalization and control of your distribution. Proper provision for emergency switching and cut overs at your cable ends will give the flexibility which is essential to proper distribution.

G & W Potheads and Boxes give absolute protection to the cable and at the same time can be the basis of a flexible distribution system.



G & W ELECTRIC SPECIALTY CO.

7440-52 So. Chicago Ave-

CHICAGO, U.S.A.

A. H. Winter-Joyner, Ltd., 62 Front St. W., Toronto.
 A. H. Winter-Joyner, Ltd., 10 Cathcart Street Montreal.
 Bentz-Richardson Co., Ltd., 592 Notre Dame Ave., Winnipeg.
 General Supplies, Limited, Calgary and Edmonton.

Electrical

News

Engineering Contracting Merchandising Transportation



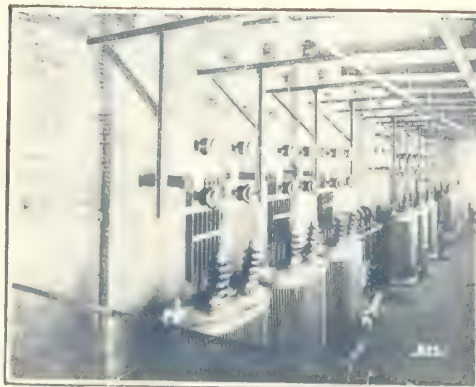
*Outdoor Type
Transformers*

MOLONEY TRANSFORMERS

Past and present performance gives
MOLONEY a reputation for uninter-
rupted service.

When choosing your next installation,
let this reputation be your guide.

Heavy Duty Furnace Type



MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, Confederation Life Bldg., Winnipeg.

District Offices

Factory

Head Sales Office

Montreal and Halifax Windsor, Ont. 1221-4 Bank of Hamilton Bldg., Toronto



The Beacon Signal
A Medieval method of
communication



Cab Tire Cable

Cab Tire Cable, as the name implies, is an electrical conductor, insulated and jacketed with a wear-proof vulcanized rubber compound very similar to that used for cab tires. It has no outer braid.

Cab Tire Cable will resist the action of steam, oil, acids or alkalis; is not affected by climatic or temperature changes; is light and flexible; will out-wear any braided cable.



Automobile Cable

Northern Electric Automobile Cables for ignition, lighting and starting circuits. The flexible conductors are insulated with an ample thickness of a high-class rubber compound. A varnished fabric tape and a varnished cotton braid protect the insulation from attack by oil and grease.

Largest Canadian Manufacturers of Bare and Insulated Wires and Cables

Northern Electric Company
LIMITED

Montreal
Halifax

Quebec
Ottawa

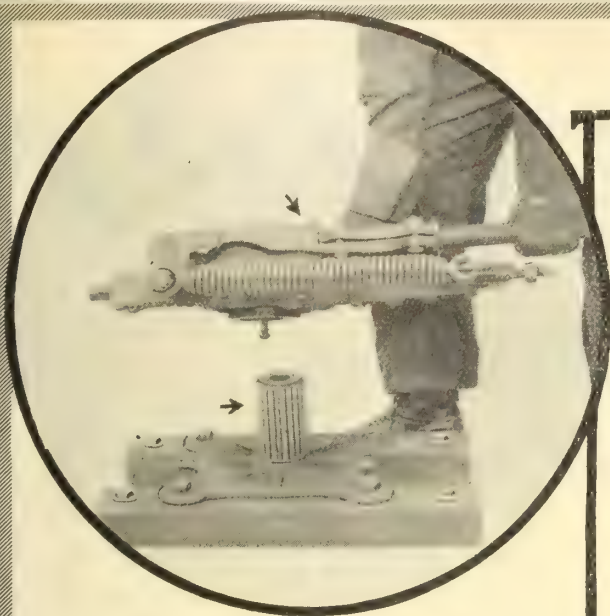
Toronto
Hamilton

London

Windsor
Winnipeg

Regina
Calgary

Edmonton
Vancouver



Notice the hook down feature and the caged roller bearings.

Simplified Maintenance Puts Years of Service in O-B TROLLEY BASE

Proper care is so easy that the O-B Trolley Base gets what attention it needs.

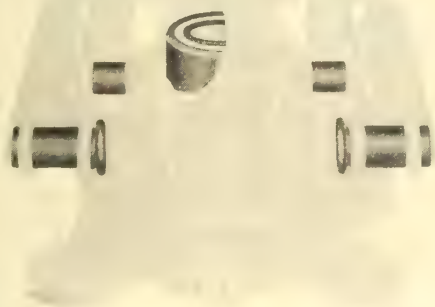
Lubrication, for instance, is a simple matter. Hook down the fork, back off a machine screw, pull out a retaining clip and one man lifts the base off its stem without removing the pole, even in car barn where headroom is minus.

The whole works is open for inspection and lubrication. The roller bearings are caged so they stand where they belong. And caged rollers never jam in service. Renewable steel bushings absorb most of the wear. It takes only a few minutes to make the O-B like new.

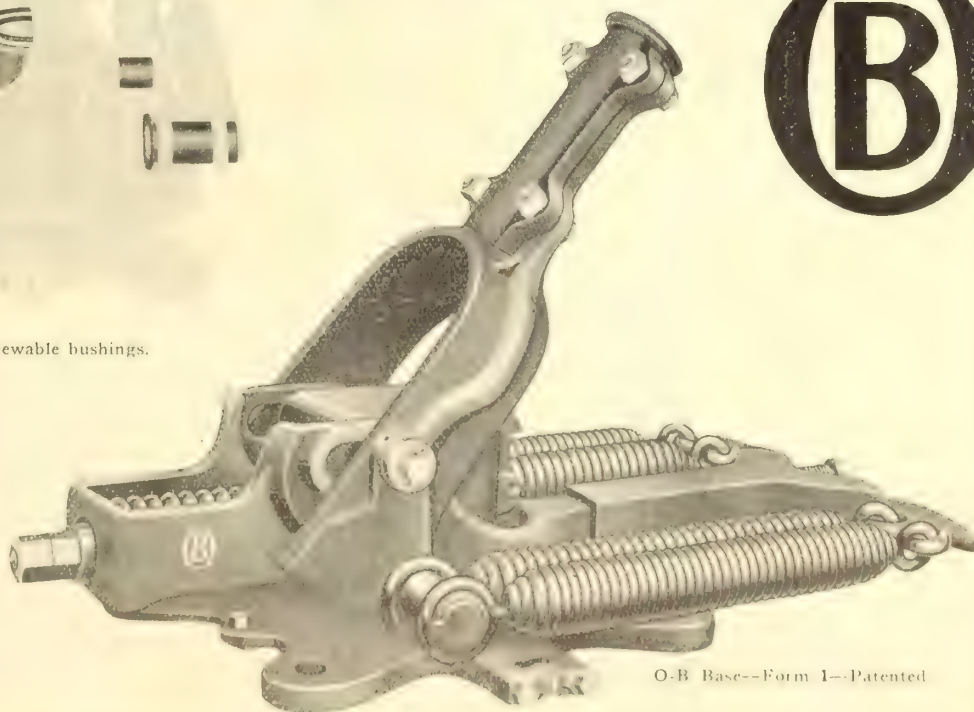
Easy maintenance plus rugged construction puts years of life in O-B Base.

Try one on your own cars at our expense

The Ohio Brass Company
Mansfield, Ohio



Dark parts are renewable bushings.



O-B Base--Form 1--Patented

Levolier

REG. U.S. PAT. OFF.



Quick Make—Quick Break

660
Watts

250
Volts

Other McGill Products

Loxon Lamp
Guards.
Metal Shades.
Portable Lamp
Guards.
Crescent coloring
Fluid.
Crescent Soldering
Paste and Salts.
Waterbury Husks.
Etc.

Pull Sockets

Here is a pull socket that is absolutely abuse-proof. The Universal lever cannot be broken off.

And in this FAUCET OF ELECTRIC SERVICE, you never worry about its carrying the heavy loads of electric heating devices.

The *Levolier* socket is noted for its smooth, easy pull in any direction.

These three features have made the *Levolier* famous and have created a big demand for them.

Dealers handling the *Levolier* have found lively sales, generous profits, satisfied customers and no comebacks.

Let us send you complete data, together with a list of other "McGill Products," or write your jobber. He has them in stock.

McGill Mfg. Co.

Valparaiso

Indiana



The CONNOR Kiddies

TRADE MARK REGISTERED

1921

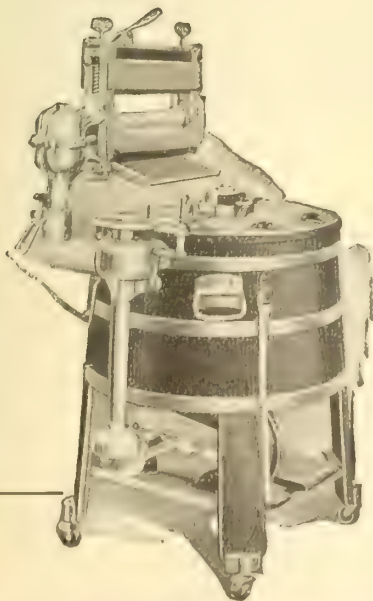
—Start it Right

Starting it right in this case is to become convinced that you can profitably handle the Connor Perfection Washer—and then to act quickly.

Investigate the Connor. Find out just where it is superior, why it is selling itself to Canadian housewives. See the Connor in operation—smoothly and efficiently doing the week's batch of washing. Get the opinion of those who use it, the judgment of a fellow dealer who sells it.

Get the facts from every angle—we'll help you—and we are of the belief that you will see in the Connor a real live selling proposition.

But do it now. Make 1921 yield you twelve months of real profit.



J. H. CONNOR & SON, LTD.

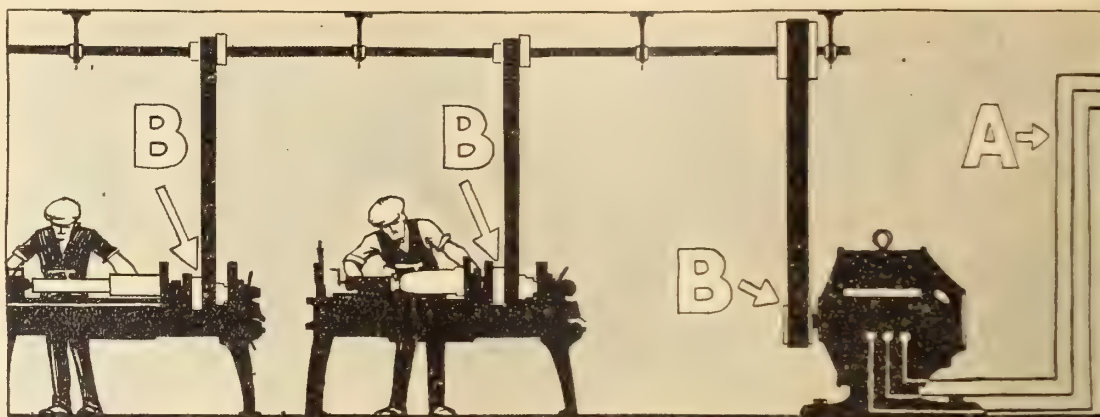
OTTAWA

ONTARIO

We carry stock for prompt shipments at Ottawa, London, Ont., and Winnipeg, Man.

For British Columbia, address Macpherson Teetzel Co., Vancouver, B. C.

"The Connor Sells at a Fair Price."



Don't ESTIMATE Maximum Demand from Points "B" — MEASURE it at Point "A"

If the Lincoln Maximum Demand Meter was as old as the question of complicated rate making every central station would be basing their bills to customers partly on maximum demand.

Estimates of what the maximum demand should be has involved considerations and calculations of motor horse power, lights and how used, and numbers of machines and how used. It has likewise involved many conflicts of judgment between the station and current user. With the Lincoln Demand Meter on the lines of each user, all personal elements are erased. **Accurate** readings of maximum demand are taken at the same time that you take readings of kilowatt hour consumption.

Every item that should enter your customer's bill, is **measured**. Every customer is satisfied. A happy relationship of station and customer is bound to result because the current consumer knows he pays for his just share of your overhead costs.

The Lincoln Demand Meter has been approved by the largest sellers of power and light in Canada. We invite **your** investigation, if you have not already done so.

Write for particulars.

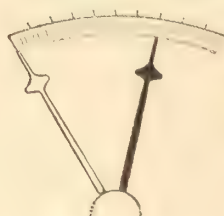
Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

Lincoln
MAXIMUM DEMAND
meter

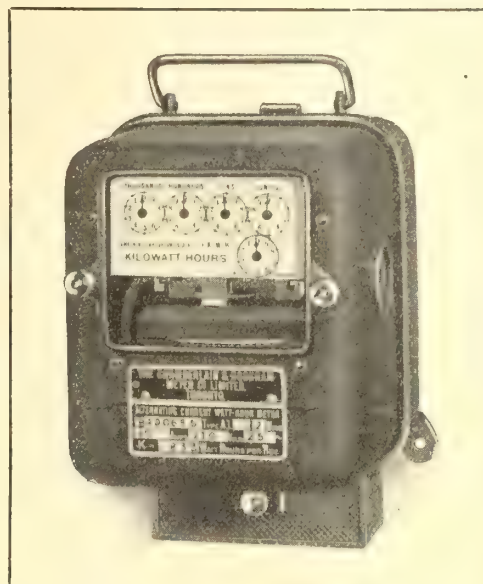


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

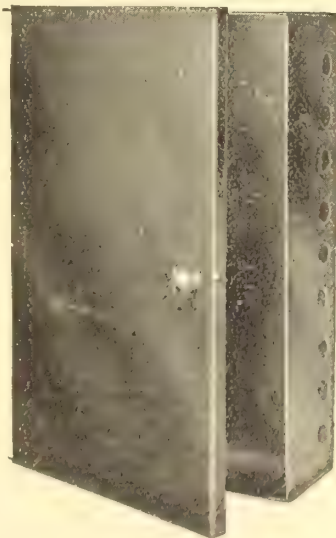
Branches all over the World

DEVOE STEEL BOXES MADE IN CANADA

We manufacture any size box

Knockouts are easily removed—no hammering the Box out of shape—and painted with a special compound and air dried or baked. The covers lap over on all four sides, making these boxes absolutely rust proof.

Our boxes are sold by all the Leading Supply Dealers.



Hundreds of Contractors are using them. You'll never know how good they are until you try them, and now's the time to do it.

Send us your specifications and we will quote you prices.

Write for Our New Catalogue No. 8

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame St. West

Montreal, Canada

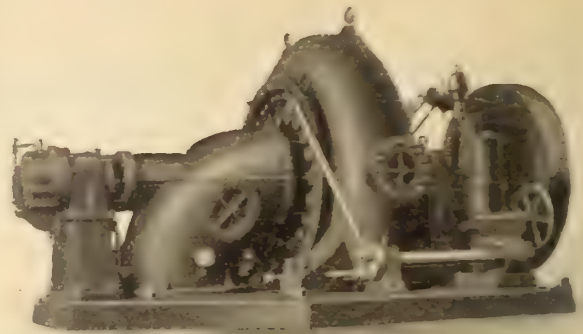
Can You Afford?

to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine. Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.



BE FIRST

Canadian Hykon Company
55 John St. South - Hamilton, Ont.



Accompanying illustration shows one of three single horizontal shaft, "Francis" type

SMITH HYDRAULIC TURBINES

Recently installed in Spain; each developing 3200 Horse Power, at 500 R.P.M. under 328 ft. head. To sustain the hydraulic thrust of the runner, each unit is equipped with a Gibbs Thrust Bearing.

If interested, write for Bulletin "N."

S. Morgan Smith Co. York, Pa.

H. B. Van Every, Rep., 405 Power Bldg., Montreal

500,000 SATISFIED USERS



Thor

Electric Washer

HURLEY MACHINE COMPANY, LTD.

413 YONGE ST.

TORONTO, CANADA

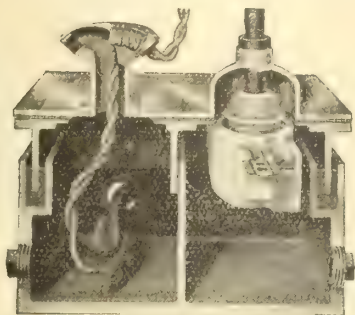
Today as always, the Thor is the most popular and widely used of all electric washers. More than 500,000 enthusiastic women have purchased Thors.

These half a million women are helping to sell Thors. There is no selling force more effective than the enthusiasm of these women. For fourteen years it has constantly kept the Thor foremost in the public mind. To it directly much of the tremendous growth of Thor business is due.

Capitalize on customer satisfaction—sell the Thor.

Fullman Floor Outlets

Two to Six Sections
ADJUSTABLE COVERS



There is no floor outlet job that the Fullman will not do, better and more economically.

Write for Complete Catalogue.

STEEL CITY ELECTRIC COMPANY
PITTSBURGH, PA.



**Here's
Your
Entire
Auto Fuse
Department**

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment
"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

FERRANTI

Constant Accuracy



WATT METER TYPE "C"

The desirable features that are inherent in the Ferranti Meter, are the result of care in design, manufacture and inspection.

They are the result of care that refuses to take a chance where accuracy is concerned—care that enables you to put complete confidence in their absolute reliability.

WRITE FOR BULLETINS
SHIPMENTS FROM STOCK

Ferranti Meter & Transformer Mfg. Co.

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TORONTO

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Vancouver

Alberta Rep.
Northwestern Engin-
eering & Supply Co.
CALGARY

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HALIFAX

145 Market Ave.
WINNIPEG
Northern Ontario
J. P. Bartleman
Timmins

FERRANTI

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Rubber Covered Wires and Cables

FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

**G
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A Galvaduct Building
Toronto Office of the Northern Electric Co., Limited

"GALVADUCT"

The most perfect interior construction conduit on the market.
Recognized as the standard of high quality.

Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you—write us.

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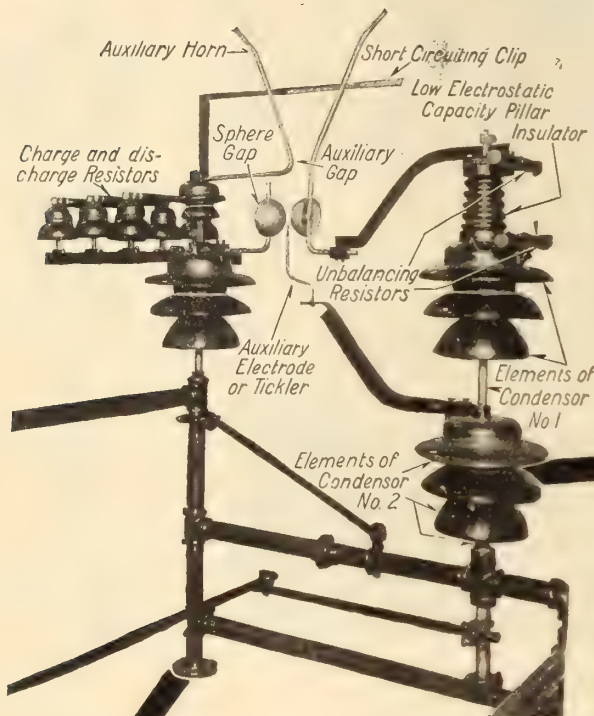
CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

Westinghouse



Protected From Lightning

Type A L Impulse Gaps,

during the year 1919, have fully demonstrated their ability to increase the

protection given by the highly efficient aluminum electrolytic arrester. The increased protection is secured by the ability of the Impulse Gap (the fastest discharge gap obtainable today) to select high-frequency, or steep wave front surges and discharge them at a voltage lower than the normal frequency discharge voltage, thus also further decreasing the time interval that the equipment is under abnormal voltage strain.

SERVICE

DEPENDABLE REPAIR WORK—and no other kind is tolerated by the cautious operator of electrical apparatus—is the natural result when per-

formed by factory-trained experts, supported by the engineering skill and manufacturing knowledge associated with the name—

WESTINGHOUSE

PROMPT REPAIR SERVICE has been assured to users of Westinghouse apparatus, by establishing at convenient points repair shops operated by the Company's Service Department, where repair work

is executed with all possible despatch, consistent with the care that is observed in the various processes entering into work of this character. Repair shops are located at:—

MONTREAL—10 St. Sophie Lane
TORONTO—366 Adelaide St. W.

VANCOUVER—1090 Mainland St.

WINNIPEG—158 Portage Ave. E.
CALGARY—316 Third Ave. E.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

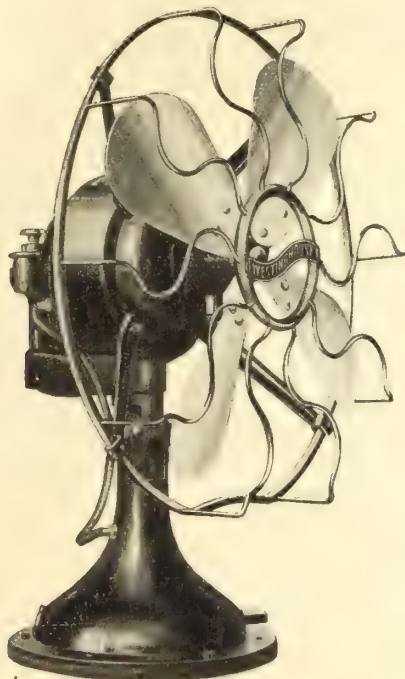
MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.



Westinghouse

1921



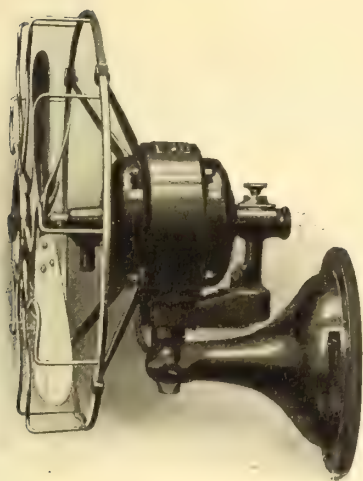
Fans

Sell a Fan

for every room in the house, for every store, for every office—this is the thought behind the Westinghouse 1921 Fan Campaign.

It is the biggest campaign you have ever been offered, and will sell Westinghouse Electric Fans.

Printed in several colors, the literature is designed to reach every prospective fan user. Distribute it to your customers and increase your Westinghouse Electric Fan Sales.



SERVICE

Dependable Repair Work—and no other kind is tolerated by the cautious operator of electrical apparatus—

is the natural result when performed by factory-trained experts, supported by the engineering skill and manufacturing knowledge associated with the name—

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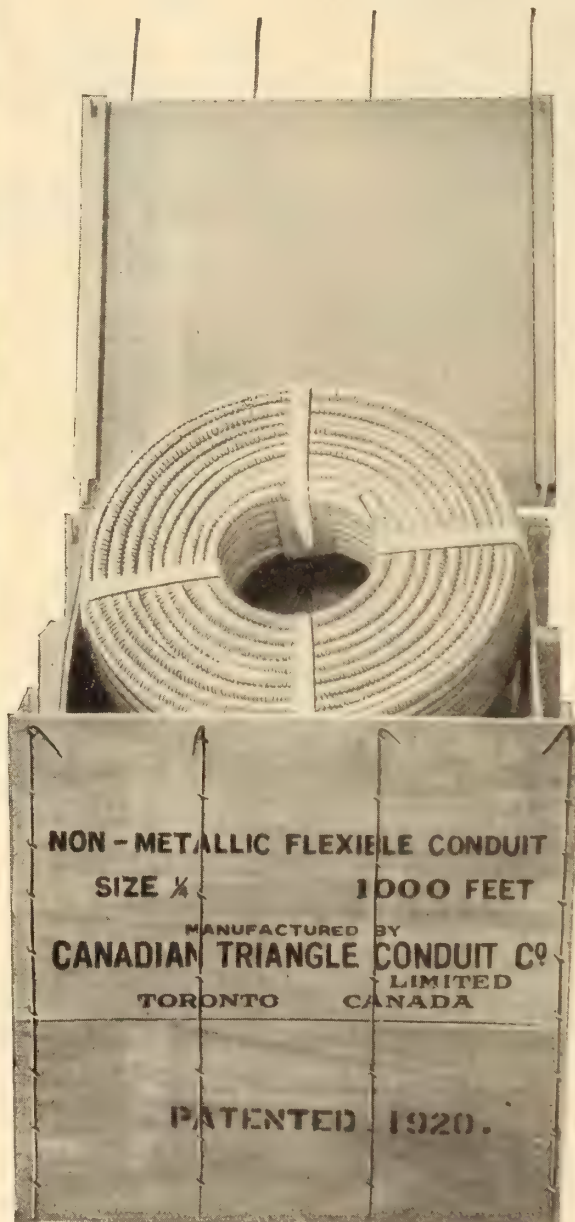
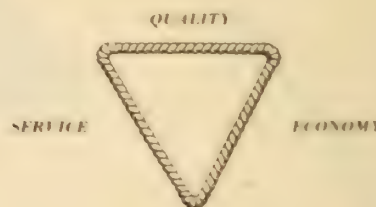


A Feature Fact OF TRI-DUCT

MADE IN CANADA

Due to the knitted loop construction and the absolutely smooth interior of Tri-Duct a number ten wire can be fished 35 feet without forcing.

Specify TRI-DUCT
when ordering. You then are sure of receiving this quality product.



Tri-Duct Non-Metallic Flexible Tubing
Tri-Cable Flexible Armored Conductors
Tri-Steel Flexible Steel Conduit
Tri-Flex Flexible Metallic Gas Tubing
Tri-Tube Flexible Automobile Tubing

Note in the picture the superior manner in which the products of the Canadian Triangle Conduit Company are packed and shipped.

*Send your enquiries
to our selling agents*

EXCLUSIVE SELLING AGENTS:—

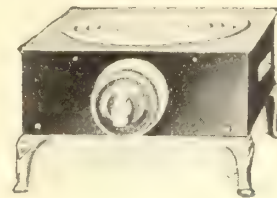
CONDUITS COMPANY LIMITED

33 LABATT AVE., TORONTO

MOFFAT'S ELECTRA'S



A few reasons why you should handle Moffat's Electra's constructed with heavy Armco iron, four times the life of steel. Insulated double jointed nickel plated doors with white enamel panels, mercury or round compensating thermometer. Quick powerful burners, wire under the burners protected from moisture. Each burner supplied with individual covered cut-



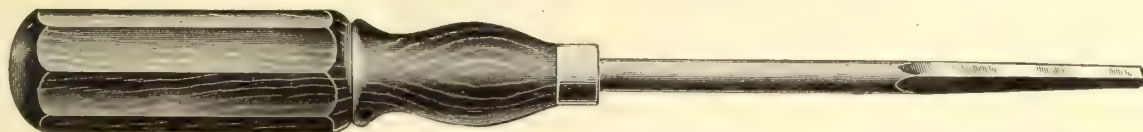
out. Burner coils made from heavy chromium nickled wire; burners easily removed, and do not require experts to make repairs. Three heat switches and heavy duty switch for 1700 watt burner. Hot Plates are sturdy, well constructed with same burners as the Ranges. A large stock always on hand. Write for catalogue and discount sheet.

FRANKE, LEVASSEUR & CO., LIMITED

DISTRIBUTORS FOR QUEBEC AND THE EASTERN PROVINCES

150 CRAIG ST., WEST

MONTREAL



Fast Replacing the Old Style Screw



The many advantages of the new Robertson Socket Head Screw are recognized by electrical contractors everywhere.

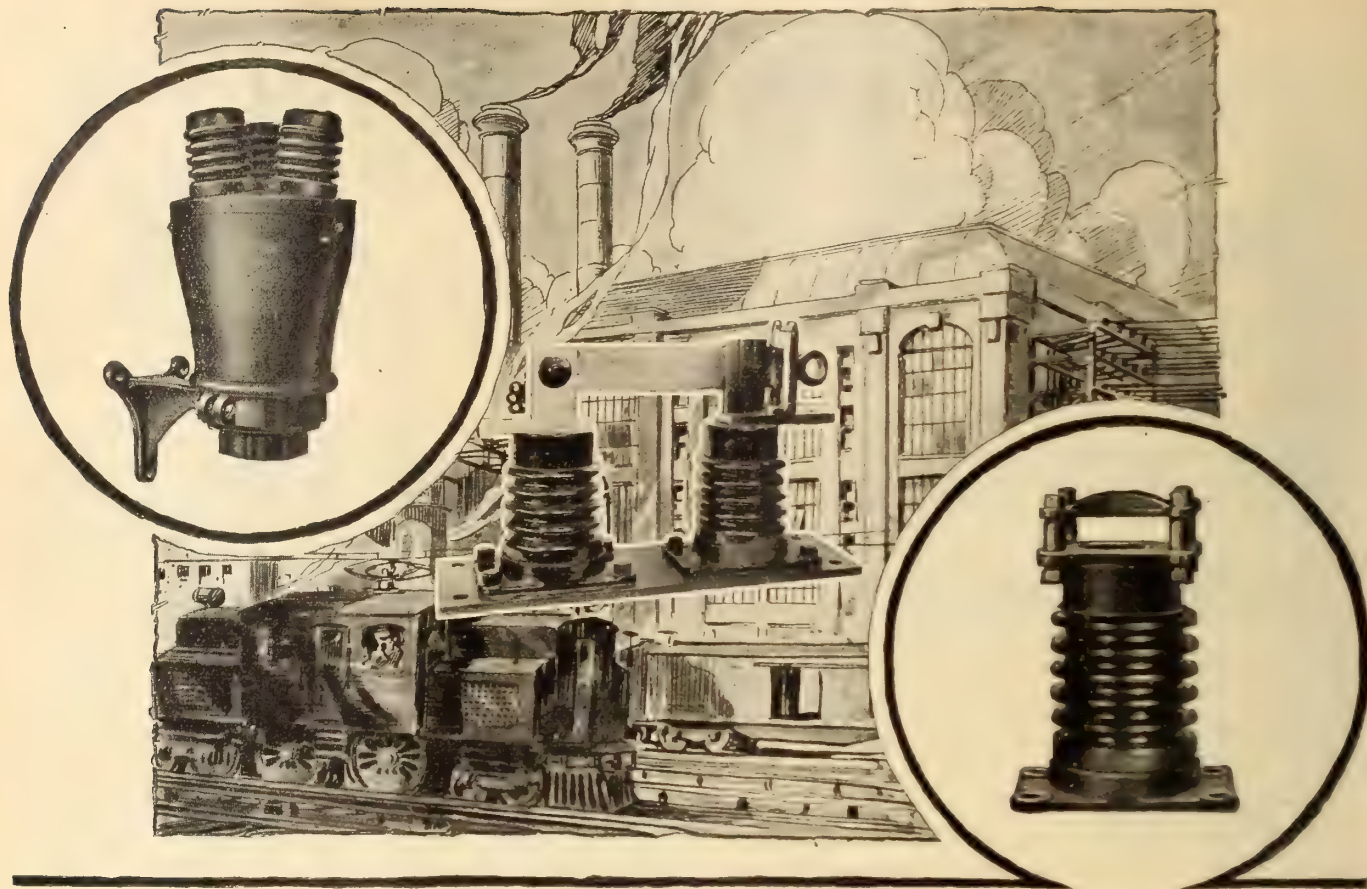
The Socket Head Screw was designed particularly for use in difficult places, such as between joists and narrow openings, or places where only one hand can possibly be used.

For arms length work on ceilings, when installing fixtures, these screws cannot be beaten, simply place a screw on the driver and it sticks there.

We supply bits to suit any ratchet, also drivers in any style, free with first order.

Write to-day

The P. L. Robertson Mfg. Co., Ltd., Milton, Ont.



“FRANKLIN” Has a Purpose

THAT purpose shows itself in every “FRANKLIN” device. For “FRANKLIN” generating station equipment is **safer**. Every feature of the line has been added only because we found a way to make not alone a better, but a safer pothead, disconnecting switch, busbar insulator, or whatever it is.

¶ Each of these devices has been developed to meet the need of some great power station. We have standardized this made-to-order equipment and it now becomes available to you. Our engineers will adapt it to conditions in your plant to make your operating safer.

¶ And the “FRANKLIN” purpose—**safety**— means greater economy. For, accidents cost far more than equipment. Good service pays better than parsimonious purchasing.

¶ Know the “FRANKLIN” line now. Write for our bulletins today. “Install the ‘FRANKLIN’ and forget it.”

ELECTRICAL DEVELOPMENT & MACHINE COMPANY

Sales Agents

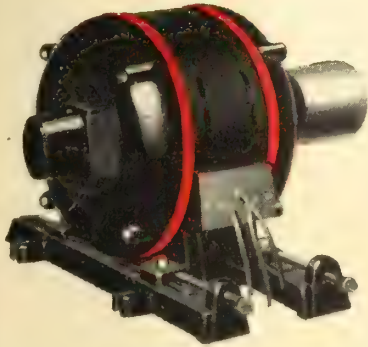
Philadelphia

Eastern States

UTILITY PRODUCTS CORPORATION
50 Church Street New York City

Central States

MIDSTATES ENGINEERING COMPANY
Westminster Building, Chicago, Illinois



Bearings in Howell Red Band Motors are unusually large, are built of phosphor bronze, and are interchangeable.

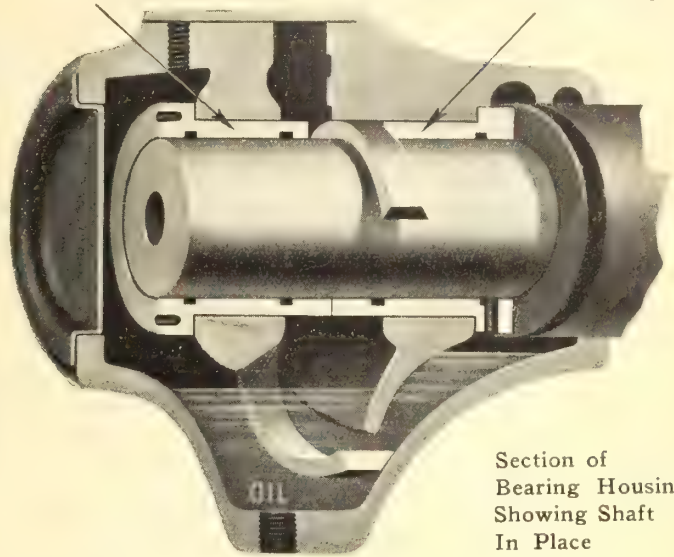
A patented re-centering feature in the Howell bearing provides for quick adjustment, so as to prevent long delays in operation.

When wear ultimately occurs in the Howell bearing, the outer bushing may be released by means of a dog pointed set screw, revolved 180 degrees and relocked in position. In this way the rotor is re-centered in the stator and the motor will continue to operate until such time as spare bushings can be ordered and installed.

Howell Motors are provided with a trap in the oil reservoir which effectively seals the reservoir and prevents any movement of oil-laden air from the bearing housing toward the rotor.

Outer Bushing: Rotate 180° to Re-center Rotor

Inner or Guide Bushing Remains Stationary



Section of Bearing Housing Showing Shaft In Place

Out-of-ordinary Features in Howell Motor Design Insure Dependability and Long Life

INHERENTLY rigid in design, Howell Red Band Motors are so constructed that they rarely require repairs even after long periods of continuous service.

Superior characteristics of Howell Red Band Motors, which assure dependable performance, are re-centering bearings which reduce bearing troubles to a minimum.

Super slot insulation, with enameled wire, double cotton covered. Indestructible rotors which are not affected by temperature changes.

Great overload capacity with conservative temperature ratings, 40° centigrade.

These superior features are included in Howell design and construction that Howell Red Band Motors may keep everlastingly on the job and serve with freedom from repairs and the resulting delays in production.

Sizes of Howell Electric Motors are one to one hundred horse power. Write or wire your requirements.

HOWELL ELECTRIC MOTORS CO.

HOWELL, MICH.

Canadian Representatives:

Toronto

Allen General Supplies, Limited,
Bank of Toronto Chambers, 205 Yonge Street

Montreal

Electric Motor & Machinery Company, Ltd.
417 St. James Street

Howell RED BAND ELECTRIC Motors

STEEL & IRON PRODUCTS



OF EVERY DESCRIPTION



HAMILTON PIG IRON

Basic Malleable Foundry

STEEL AND IRON BARS

OPEN HEARTH STEEL SHEETS

RAILROAD TRACK MATERIAL

Angle Bars Track Bolts Tie Plates Tie Rods Spikes

SCREWS

Steel
Brass
Bronze
Wood and
Machine
Screws

WIRE

Steel and Brass, Copper and
Bronze, Heavy and Fine,
Bright, Annealed, Coppered,
Galvanized, Tinned, Stranded,
Steel and Copper Cable,
Barb, Woven Clothes Line

NAILS

Wire
Cut
Boat
Horseshoe
Shoe Nails
Tacks

POLE LINE HARDWARE

Pole Steps Cross Arm Braces Guy Clamps Guy Rods

WROUGHT PIPE

Black Pipe
Galvanized Pipe
Nipples
Couplings

FORGINGS

Car Axles
Shape and Drop Forgings
Carriage and Automobile
Hardware

LEAD PRODUCTS

Lead Pipe
White Lead
Shot
Putty

BLOOMS

BILLETS

PLOW
BEAMS

ANGLES

CHANNELS

THE
STEEL COMPANY
OF
CANADA

HAMILTON

LIMITED

MONTREAL

WIRE RODS

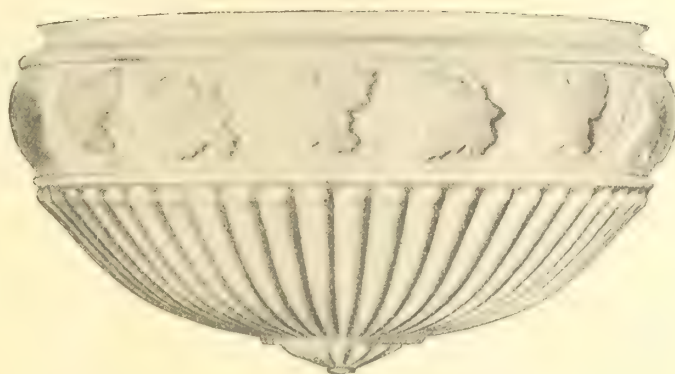
HORSE
SHOES

FENCING

RIVETS

BURRS

The Bowl with the Maple Leaves



CANADIAN ALL THROUGH

A very handsome lighting Bowl, made in "Lumo" or "Moonstone" R. O., also in colors—faint green, old ivory, pink or blue.

This Bowl has proven the best seller in its class. It will pay you to display it.

Jefferson Illuminating Glassware gives the final touch of beauty to the store, home, or public building.

Let us give you more information.

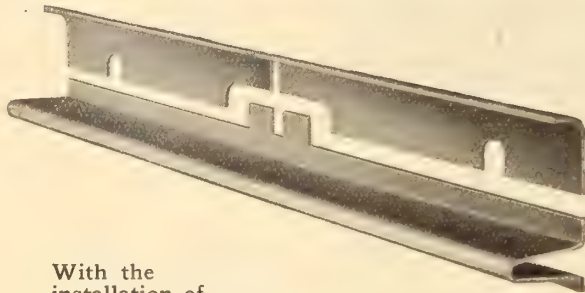
Jefferson Glass Company, Limited

Down-town Showrooms: 164 Bay Street, Toronto
Factory and Office:
388 CARLAW AVE., TORONTO

Montreal, 285 Beaver Hall Hill
Winnipeg, 272 Main Street
Vancouver, 510 Hastings St. W.



Railway Insulation



With the installation of automatic block signals and electric power in railroad work the demand for vulcanized fibre has greatly increased. It has, in fact, become an important part of the regular equipment.

The reasons are these: 1. Low initial cost. 2. The readiness with which it is bent and punched to conform to the different shapes and styles used. 3. Its ability to withstand excessive pressure and vibration. 4. Its toughness and density which give it durability under all sorts of weather conditions. 5. Its insulating properties.

To give satisfaction the fibre should contain every one of these qualities and in "Diamond—F Railway Insulation" we offer you a product which does.

Give us a trial order. We manufacture insulators for all electric railway purposes such as, Sheets, Rods, Tubes, Insulating Paper, Horn Fibre, Bushings, Washers, Etc.

*Write to-day for information regarding
Diamond Fibre Products*



Dept. B.

**Diamond State Fibre Company
of Canada, Limited**

455 King Street W., Toronto, Canada



The electrical merchant is offered a splendid selling proposition in the BAETZ line of Portable Electric Lamps and Silk Lamp Shades.

Many attractive designs to choose from. Prices right. Shipments prompt.

Baetz Bros. Specialty Co.
Limited
Kitchener - Ontario



Tell the Story of Fan Comfort At the Movies



There is no way in which the story of fan comfort can be told more thoroughly and effectively than it can through the medium of a motion picture story. To enable dealers in R & M Fans to take advantage of this medium we have had a short trailer film prepared, entitled "Where Breezes Blow."

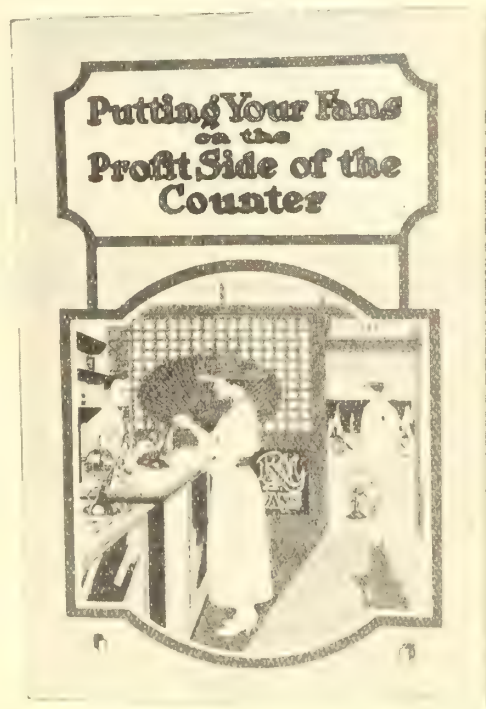
The film is very short, requiring less than a minute to run and can be scheduled in the theatres at low cost, but it is right to the point and puts across the message of fan comfort in a very entertaining and effective way.

The film was produced by a prominent producer of motion picture films and was posed by a finished cast of actors. It is a high-class proposition in every way.

The dealer's name and advertising message are flashed on the screen full size at the finish of the picture.

In addition to this film, the R & M line of Fan advertising helps for 1921 includes booklets, folders, window display material, slides, newspaper cuts—everything for a complete campaign.

Samples of the material are shown in our new Dealer Helps Book No. 1159, shown opposite. A copy will be sent on request.



The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans



CELEBRATED
X-RAY
Color Lighting
for
Distinctive
Show Windows

National X-Ray Reflector Company
 New York CHICAGO San Francisco.
 Representative for Eastern Canada Representative for Western Canada
 George J. Beattie Cochrane Stephenson & Co. Ltd.
 72 Victoria St. Toronto 602 Avenue Block - Winnipeg

Stoltz & Williams
 Chicago



For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

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Made in Canada Goods Must Compete in Price and Quality

Mr. Frank P. Jones, general manager, Canada Cement Company, is quoted as suggesting that we substitute the slogan "Produce at a Price and a Quality that will enable Canadians to buy in Canada" for the present slogan "Buy in Canada."

This will appeal to the average Canadian citizen. The original of this standard slogan was a "Made in Germany" affair, and its chief foundation was egotism, selfishness, and absolute disregard for the rights of others. We do not believe that industry can be built up on this basis, and Germany's experience during the past six years amply proves it.

In the long run there is no sufficient reason why people should buy "Made in Canada" goods except that Canadian goods are equal in quality and no higher in cost. Sentiment will never induce our citizens to buy an article of poorer quality or pay a higher price for it simply because it is home-made, and all the more is this true if our people have the idea that undue profits have been made by the manufacturer. The only way to make the "Made in Canada" slogan a success is to follow Mr. Jones' suggested motto and make Canadian goods more attractive than foreign goods both as to quality and price.

This is plainly a viewpoint that is frequently lost sight of by the average Canadian manufacturer. In the main he is protected. This protection has been given him because

it was felt that Canada needed manufacturing industries, and that these industries in their initial stages were not strong enough to compete with similar established industries in foreign countries. The manufacturer must not forget, however, that this concession was made for the benefit of the nation at large and not for the benefit of the individual, and it is this feeling that the individual has benefitted most that has created the attitude of suspicion with which the average citizen regards what he chooses to term the "moneyed interests." There is no use asking the Canadian public to buy "Made in Canada" goods in order to enrich the Canadian manufacturer. That is a sentiment that does not appeal to them. When the Canadian manufacturer produces merchandise of equal quality to that imported and at a price which will compete with the price of the imported article the Canadian public will buy it without being urged. The heart of the Canadian public is in the right place. They object to being "exploited," however, and the call to buy made in Canada goods that may not compete in quality or price with imported samples appeals to them in that light.

Keep Management of Canadian National Railways Free From Politics

Just at the moment there is no question occupying quite so prominent a place in the Canadian public's mind as "What will be the outcome of President Hanna's 'no politics' order?"

It will be remembered that a few weeks ago President Hanna of the Canadian National Railway System issued an order that all employees of that system must refrain from taking part in politics—an order which simply meant, in other words, that an employee of the government railways must not enter into a public controversy regarding the policy of his employer. Consider the case, for example, of a government railway employee becoming a member of parliament, thus placing the president and other officers of the road in the position of being also that employee's servants. Such a position would be untenable, ridiculous in the extreme, and diametrically opposed to the possibility of a business-like administration of the government's business. The order was followed, however, by vigorous protests from labor agitators and the government was prevailed upon to appoint a Conciliation Board of three members to make a report. This report has just been made public and condemns, by a vote of two to one, the president's order. It is safe, we believe, to say that such a report came as a complete surprise to ninety per cent. of the electors of Canada who are indignant at this evident effort to make our national railway system a political football.

The question at issue is a national one, for it is in effect—can national ownership succeed or must it fail? Is it impossible to divorce the management and development of national utilities from politics? Across the line they made the same experiment during the war and the answer they give is, no! In various parts of Canada the same experiments—on a smaller scale—have been tried in the way of municipal management of waterways, electric railways and electric light and power distribution, and in connection with

The field for electrical appliances is as big as it ever was. The general public is as keen as ever to possess them. Why talk "depression," or "slow business?" The demand exists, and the people have the money. Can't we sell them?

these experiments there is no single manager who will not tell you that the "curse" of the whole thing is politics, and only in proportion as the management have been left their independence have they been able to make a success of their enterprises.

Government ownership is to-day on trial and we venture the opinion that the answer to the question "will Hanna's order be upheld or not?" will also at the same time answer the other question "will Canadian Government ownership of the railways be a success or a miserable and expensive failure?"

Increased Efficiency Better Than Reduced Costs

In discussing the prospects for the coming year one is apt to lay a good deal of stress on the necessity for reduced costs of materials and wages. The labor man particularly is insistent that he should not be the first to be asked to make a concession because, after all he argues, the cost of labor in the manufacture of the average article is less than the cost of raw materials entering into that operation. In a recent argument between two delegates, one representing labor and the other the construction industry, the labor man said: "What right have you to make me concede something in wages before the costs of raw materials come down, when labor represents only 40% of the cost of your building?" The answer of the employers' delegate was: "You forget that 80% of the cost of raw materials is also labor." This being the case and taking the labor man's own figures the actual cost of labor in constructing a building is 40% added to 80% of 60%, making a total of 88%.

Applying this to a concrete case of building during the summer of 1920 which would then cost \$100,000, it will be seen that the cost of the raw materials is \$12,000 and of the labor entering into the construction of that building from beginning to end, \$88,000. Now, even supposing wages do not fall, but instead, that labor increases its efficiency by one-third—which it is generally conceded can easily be accomplished—the cost of that building can be reduced one-third of \$88,000, leaving the total cost of labor about \$60,000 and the total cost of the building \$72,000. Here then, without penalizing labor in any way, without reducing anybody's profit, we can during the coming summer, if labor will be reasonable, reduce the cost of building 28%.

It would seem, therefore, that this is a much more satisfactory line of action to pursue than a reduction in wages. It can only be brought about, however, when labor realizes and admits these conditions. The next step, which would logically follow, would be a reduction in the various articles the labor man needs to buy and this in turn would make it possible for him to accept a lower wage without sacrificing his present style of living. The initial step, therefore, and the biggest factor ultimately in the reduction of prices to their pre-war basis with as little distress as possible, lies in the speeding up of the 88% which enters, in the main, into the cost of the finished article in every one of Canada's industries.

Interesting Meetings at A. I. E. E.

Two very interesting and informative lectures have recently been given before the American Institute of Electrical Engineers, Toronto Section, one on January 28th, by Lester W. Gill, Director of Technical Education for Canada, on the subject "Technical Education," the other on February 4th, by Theodore Varney, chief electrical engineer of the Aluminum Company of America, on "The Use of Aluminum Conductors for Transmission Lines." The paper presented by Mr. Varney will appear in the March 1 issue of "Electrical News."

Quebec Streams Commission Issues Eighth Report—The Second-Foot Head Method

In the report for the year 1919, just issued by the Quebec Streams Commission, there is an interesting article on the regulation of the River St. Francois by means of a dam at Lake St. Francois. The companies which draw power from the St. Francois River and pay annual dues for the storage of the water in the lake are: The Brompton Pulp and Paper Company, Limited; The Champoux Company; The St. Francois Hydraulic Company, Limited; the City of Sherbrooke; the Canada Paper Company, Limited, and the Southern Canada Power, Limited. The article reads as follows:

"In order to pay for the cost of completing the works in connection with the water storage in Lake St. Francois and in Lake Aylmer, including the purchase of all flooded lands, the commission decided that it should draw an annual revenue of \$55,874.

"To divide this amount amongst the parties benefitting from the storage, an estimation of the amount of additional power due to storage had been made and the rate arrived at was \$7.50 per h.p. year. But, as the amount of additional power in each case was uncertain and could be contested,—owing to the lack of data regarding the flow of the river under natural conditions, it was decided to use a method eliminating the time factor. This method consists in multiplying the volume of water per second which is discharged over the minimum natural flow, by the height of fall over which this water is used. This method is called 'second-foot head.'

"For example: the amount of water discharged from Lake St. Francois is 500 second-feet above the natural minimum flow. This water is used by the St. Francois Hydraulic Company over a head of 40 feet. The product of $500 \times 40 = 20,000$ second-foot head is the basis upon which this company may be taxed. For the power users below Lake Aylmer as, for example: The Brompton Pulp & Paper Company which uses three falls for a total head of 85 feet, the discharge which it gets from Lake Aylmer is 650 second-feet above the natural minimum flow. The product of $650 \times 85 = 55,250$ second-foot-head is the basis upon which this company should be taxed.

"Having made this calculation for every company, the tariff of 50 cents per second-foot-head was arrived at, that is to say, that the St. Francois Hydraulic Company must pay \$10,000 and the Brompton Pulp & Paper Company \$27,625. And so on for the other power-users.

"Contracts were passed with the city of Sherbrooke, which owns a hydro-electric plant at Weedon, and with the Canada Paper Company, Limited, which owns a mill at Windsor Mills, and with the Southern Canada Power Co., Limited, which operates a hydro-electric plant at Drummondville. These contracts provide that should the present head be increased, the annual payment shall be increased accordingly. The Southern Canada Power Co., Limited, has reconstructed its plant at Drummondville and increased the head from 12 to 30 feet. The company was advised that its annual payment would consequently be increased from October 1st, 1919."

The report contains data and graphs with regard to the drainage area, rain fall, depth and discharge of various rivers in the province, together with a description and plans of dams recently built or extended, besides some suggestions for water power developments.

The town council of Parry Sound will purchase a 1000 gallon fire pump and the necessary hose, engine, 2200 volt motor. Extra transformer capacity also required.

Montreal Light Heat & Power Company to Extend Plant at Cedars Rapids

In a report just issued by the Montreal, Light, Heat & Power Company Consolidated, it is stated that notwithstanding the present cost of building, it will be necessary to extend the Company's hydro-electric plant at Cedar Rapids, Que. The work comprises two additional units of 10,800 h.p. each, and involves the extension of the power and transformer houses and transmission system. The two additional units, to be completed this fall, will give the plant a nominal available h.p. of 150,000.

The company has decided to make its fiscal year end with the calendar year instead of on April 30th. The figures for the full year of 1920 show a gross revenue of \$12,748,409, from which expenses and depreciation were deducted, leaving a net revenue of \$4,882,965. Fixed charges of \$1,078,449, are also deducted, leaving a net income, applicable to dividends, of \$3,804,506, equal to 5.9 per cent on the outstanding capital of the company. The net income applicable to dividends in the previous twelve months was equal to 5.6 per cent. on the outstanding capital, so that this represents an increase of 0.3 per cent. The increase in dividends over the previous year is \$658,488, and expenses increased \$1,452,794. The surplus for the year is \$583,768.

The balance sheet shows an increase of nearly \$2,000,000 in assets, which amount to \$78,306,530, and current liabilities an increase of about \$350,000, the working capital being \$6,824,478, an increase of 9.3 per cent. over the 1918-19 period.

Stock, etc., interest in other companies has been reduced from \$65,428,365 to \$63,495,650, while advances to subsidiary companies have increased from \$1,765,237, to \$4,712,485. Investments are unchanged and accounts and bills receivable are up about \$440,000 to \$1,761,468, while the coal item is up about \$600,000. Cash shows a slight increase at \$2,222,324.

On the liabilities side of the account, the capital stock of the company shows an increase of \$350,000 at \$64,475,500; depreciation allowance has increased about \$500,000 to \$6,778,674, accounts payable by about \$400,000 to \$1,518,634, and deposits by clients have increased by more than \$100,000.

Winnipeg's City Electrician Offers Suggestions Regarding Grounding the Frames of Air Heaters

Winnipeg, January 21, 1921.

Editor, Electrical News:—

I have read with much interest your editorial in regard to bathroom fatalities from electrical causes in the issue of the 15th inst., and agree with you that this matter should receive the attention it merits at electrical conventions. Municipal inspectors who are charged with the duty of dealing with the life risk as well as the fire risk have, I think, recognized this problem as being one requiring adequate treatment in the past in so far as the installation of lighting facilities were concerned. For instance, in this city we have, for the last ten or more years, insisted on bathroom lights being placed on the ceiling and controlled by switches, such switches being located out of reach of persons handling plumbing fixtures. But the problem has been intensified by the growing use of all kinds of utility devices, many of which are used in bathrooms.

As an example of the proportion this reaches, I might cite a case recently discovered in this city where a building formerly used for hotel purposes, having bathrooms attached to each suite of rooms, has now been turned into a tenement building. On making a re-inspection, we found

a large number of small electric stoves being used in the bathrooms for cooking purposes. In this particular building the wiring was installed before the present regulations were drafted and the lighting in the bathroom was by a bracket to which the heaters were found connected by means of a two-way cluster plug. Of course, in this case we required the owner to eliminate the bracket and install a receptacle on the ceiling in order to make it more difficult for the tenant to carry on the practice noted.

We are also in this city attempting to deal with the radiator problem in bathrooms by recommending that the radiator be permanently installed with its frame grounded and solidly connected to the wiring outlet. In case this cannot be secured, we call for a three-wire receptacle, with a ground wire connected to one of the binding posts, and a three-wire cord and plug with the third wire connected to the radiator frame. While it might appear that these measures would fairly successfully deal with the radiator problem, there is an ever-increasing use of other devices bought mostly over the counter from a dealer and connected by some means or other to a lighting outlet without any inspection.

I cannot offer any suggestion as to how this can be taken care of except by having the lighting outlets placed upon the ceiling out of reach and making it as difficult to attach a portable to as possible.

I would offer another suggestion and that is that the neutral of a 3-wire system or one side of a two-wire system supplying current to buildings for lighting and heating purposes, etc., should be grounded in a thoroughly efficient manner. In this city while we have had a number of fatalities, such as the one related by you, in past years, there has not been one case where even a severe shock has been reported in the districts of the city that have been protected by the grounding of the secondaries. The grounding system in this city is of a very thorough character, the light companies being required to connect to the water mains on the street; grounds inside buildings are only allowed as auxiliaries to the made grounds outside, the consequence being that we have extremely low resistance paths to ground. This is a matter I think that is not always given the attention it deserves and I have still to be convinced that A. C. secondary circuits, thoroughly protected in this manner and in which the nominal voltage to ground does not exceed 110 volts, are capable of producing fatal shocks.

Yours truly,

F. A. Cambridge,
City Electrician.

Montreal Electrical Club Luncheon

At the weekly luncheon of the Montreal Electrical Club, held at Freeman's Hotel, on January 26th, Mr. C. B. Brown, physical director of the Westmount Y.M.C.A., gave a talk on the office boy of to-day, stating that the aim of the employers should be to build up the character of their younger employees. He advocated the plotting of a chart for every young man, whereby the development of the psycho physical qualities of the employees could be noted from time to time. These charts would show at a glance what service was to be expected from each individual.

Mr. L. B. McFarlane presided in the absence of Mr. W. H. Winter, and after thanking Mr. Brown, referred to the wide range of subjects covered by the speakers at these luncheons.

Mr. M. E. Deering, of the Northern Electric Company of Winnipeg, was called upon to say a few words. Among the visitors were Mr. H. W. Morden of Hamilton and Mr. J. C. Noice of Toronto.

Municipal Electrical Engineers of Ontario Hold Annual Convention

An Association with Lots of "Pep" and Enthusiasm—Unanimous Opposition to Tax Suggested in Government Committee Report

The convention of the Association of Municipal Electrical Utilities of Ontario which was held at Toronto on January 27th, 28th and 29th, was attended by a large number of delegates. The morning of the opening day was given over to registration and a visit to the laboratory of the Hydro-electric Power Commission. In the afternoon the association met in the Chemistry and Mining Building, University of Toronto.

The President's Address

The meeting opened with a brief address from Mr. O. H. Scott, the retiring president, who stated that it was gratifying to note the large attendance, which was much better than a year ago, and which he thought evidenced that the worries of power shortage were over, and had enabled those present to leave their work for a few days with clear consciences. Continuing, he said, "in reviewing the work of the past year I don't think there is anything, at least to my mind, that is quite so important as the report of the Rules and Regulations Committee on the standardization of plugs. To my mind, it is a very important decision, and I have been wondering if, when the utilities have been doing their purchasing, they have borne in mind that report. Sufficient time has now elapsed since the handing down of that decision for manufacturers to have adjusted themselves to it, and the municipalities should now demand only standardized plugs, when purchasing. There is not much use in having these committees go to work and present detailed reports unless the municipalities make use of them. With reference to the future, there are several things that strike me as being very necessary for the association at large. We have heard a great deal about co-operation among the various electrical fraternities, such as, manufacturers', jobbers', contractor dealers', etc., but it strikes me that there is great room for co-operation among the utilities themselves. This was brought to my mind during the power shortage last fall. For example, I noticed that one man in one part of the Niagara Peninsula was having power taken from him and given to a city in another district. Another man in another section was being discriminated against in favor of someone else. All those things in my mind tend to stir up ill-feeling among the various towns which we, as operating men, must stop. Of course, may be they are more political than otherwise, and did not originate in the Hydro office, but at the same time it points out the necessity of all operating engineers and executives getting closer together and co-operating as closely as possible, because while your commissioners come and go from year to year, most operating executives are there for a good many years.

I think that the association could do a great deal in various matters which come before it, by bringing more men into the committee's work. There are, no doubt, a great many problems that are bothering various operating men which should be gone into by the executives of the association.

Another matter that strikes me as being of importance, and that is our bulletin. From time to time we have had invitations from the committee who edit the bulletin to send

in articles, and last year it was suggested that we should send in comparative statements of the business we were doing. This is a great opportunity for executives to get real information, but up to the present it has not been used to the extent it should be. There is a fund of information that the executives in different towns have which could be used in the bulletin.

The program which is before you to-day says nothing about the selling of appliances. This was done for a purpose. The executive thought that owing to shortage of power they could not discuss the question of the sale of appliances, so that matter was left off the paper, but it seems to me that there again we have a vast field for co-operative effort among the various utilities by getting together and by special advertising campaigns, carried on throughout the whole province of Ontario, the different utilities possibly using the same type of advertising and a standard wording, and in other ways, the co-operative effort of all the utilities would, to my mind, practically swamp the utilities with the appliance business."

Election of Officers

Following this address the election of officers for the ensuing year was proceeded with. Those elected, were as follows: President, M. J. McHenry; vice-president, R. H. Martindale; secretary, S. R. A. Clement; treasurer, G. J. Mickler. The district vice-presidents for the next twelve months are as follows: Niagara, J. G. Archibald; Central, A. T. Hicks; Eastern, H. F. Shearer; Northern, R. H. Stafford; Georgian Bay, E. J. Stapleton. The various committees for the ensuing year are: Convention Committee, P. B. Yates, chairman; E. I. Sifton, J. J. Jeffrey, Geo. Leacock and J. W. Bayliss. Papers Committee—H. H. Couzens, chairman; L. G. Ireland, J. G. Jackson, R. T. Jeffery, C. H. Hopper. Regulations and Standards Committee—R. H. Starr, chairman; T. C. James, H. O. Fisk, A. Hall and W. P. Dobson. The auditors are: W. G. Riordon and H. P. Hillman.

The New President

Called upon for a speech, Mr. M. J. McHenry said: "Perhaps it is a little early to say anything about the work of the association, but I have been very much impressed with the remarks made to-day by our president in connection with closer co-operation among municipalities. I believe we have a large field before us in that respect, and if the association in future can work out some form of closer co-operation we shall be doing a great benefit not only to the association but to the Hydro in general. I thank you for the honor you have done me in electing me president of your association. It will be difficult to live up to the high standard established by your previous presidents, but I will do my best."

A paper on "The Economical Handling of Range Loads on Distribution Systems" was then read by Mr. C. F. Schwenger, engineer of distribution, Toronto Hydro-electric System, which brought out lively comment from the delegates. This paper was reproduced in our issue of Jan. 15.

Discussion then turned upon the report of the Select Committee of the Legislative Assembly on "A More Equi-

table System of Distributing of Hydro-electric Power, and a More Uniform Rate." One member stated it as his opinion that it was unfair to attempt to charge power companies who had capitalized their own developments the same rate as those that had obtained government assistance. Another member expressed himself as follows: "We have in the process of completion at the Chippawa a pretty large proposition on our hands incurring an investment which is a direct liability of the municipalities. We have got to sell that power in order to carry our costs. We are competing with Quebec province which is in some ways more favorably situated than we are. If we are going to handicap the



M. J. McHenry, President-elect

province of Ontario by increasing the cost of power we are not going to sell that power, because it will be too expensive to sell. We have in the past complained about the exactions of labor, but this increase in the cost of power, if made effective, would increase the cost far more than the exactions of labor have ever done. This committee, made up of three farmers, a plumber and a retired gentleman, have hardly, it seems to me, gone into this matter deeply enough to find out where they are going to get off." He instanced the case of the Hydro contract with the Canadian Carbide Company, which had five or six years to run, and pointed out that the tax in the case would cause a loss of \$32,000 a year to the Commission. He figured also that Toronto would have to pay, on its present power consumption, \$120,000 a year. He stated that there were some cases where contracts were signed for forty years ahead, at a fixed rate, and in such cases the municipalities would have no redress from their customer and would have to shoulder this additional load themselves. Continuing, he said: "If we are going to equalize the cost of power, why not do the same with eggs which cost us from \$1 to \$1.20 in the city and can be purchased on the farm for 50 and 60 cents a dozen. It's the same principle!"

City Taxes Are High

Another delegate stated he paid more in taxes on his eight-roomed house than a farmer pays on his two hundred acres. He warned against getting the Hydro mixed up with politics. The Hydro Power Commission had, under the able leadership of Sir Adam Beck, been able so far to successfully manage its own affairs, and was quite able to continue to do so. He claimed that if the development ever fell into the hands of politicians it would sound the death knell of the project.

"A camouflaged flat-rate proposition" was the way one delegate interpreted the report. "It is getting away from the basic principle of 'power at cost'."

The meeting adjourned to permit the delegates to attend the convention dinner at the Hotel Carls-Rite, where an address was given by the Hon. I. B. Lucas, Provincial Hydro-electric Power Commissioner.

Friday, January 28th

The morning session was to have opened with talks by T. H. Hogg, assistant hydraulic engineer, and E. T. J. Brandon, electrical engineer, on "Engineering Features of the Chippawa-Queenston Development." Mr. Hogg was unable to be present and his place was taken by M. V. Sauer. The talks were illustrated by lantern views and "movies" and were thoroughly appreciated by the delegates.

The meeting adjourned to the Electric Club, Mossop Hotel for luncheon, where an address was given by Premier Drury.

The afternoon session opened with the reading of a paper on "The Testing and Approval of Electrical Appliances in Ontario," by W. P. Dobson, laboratory engineer Hydro-electric Power Commission of Ontario (Printed in our Jan. 15 issue). This precipitated a discussion on the recent bathroom fatality in Toronto. A letter was read from Mr. Cambridge, city electrician of Winnipeg, commenting on the recent article in the Electrical News, and urging that the matter be discussed at the convention. Mr. Dobson explained that the fatality in question was caused by a defective electric heater of the reflective type, which was in common use. He pointed out, however, that it was an old model, that the particular defect had been previously brought to the attention of the manufacturer, and had been rectified in the later designs. The type of terminal used on this



R. H. Martindale, Vice-president

heater was a standard type, but it was found upon examination that the heater had apparently been tampered with, and that in re-assembling it a different type of terminal was used, which permitted of too much leeway, with the result that the terminal got in contact with the frame of the heater and electrified it, so that when the woman reached over to move the heater, she made a ground connection.

Mr. Dobson recommended the use of polarized plugs. This suggestion was supported by several of the delegates present. Others argued that education was the primary need for the prevention of accidents. A delegate representing a prominent central station stated that his municipality printed

warnings in their monthly bulletin about the risk in handling appliances, and pointed out that switches should never be touched while one hand is in contact with water or metal.

Another delegate stated that he had had more complaints of shocks from electric irons than any other kind of appliance. He held to the opinion that it was not possible to make appliances fool-proof, and that the only thing that could and should be done was to educate the people. When the people know the danger they can handle them with some degree of safety. "This is certainly a matter for publicity," said another delegate. "The children should be educated to the use of electrical appliances, as well as the parents." Another delegate advocated greater insulation in the frames of portable appliances.

More Discussion on Suggested Tax

Discussion was then re-opened on the report of the Legislative Committee on the tax on Hydro power. Mr. R. T. Jeffery said that Sir Adam Beck's original proposal for a rental differed from the report of the committee to the extent that the water rentals from navigable streams went to the Dominion Government, and the rentals from other than navigable streams were the property of the province. This was being followed out at Niagara Falls, where the rentals were paid to the Niagara Park Commission, which was a body appointed by the Government. Sir Adam's proposal was that the provincial government should collect all of the water rentals, and this money should be used to defray part of the capital cost of constructing rural lines. The method now brought forward was to charge a tax in addition to the rentals being collected.

One delegate, referring to Mr. Drury's speech at the luncheon, said he believed to a certain extent that Mr. Drury was correct in advocating a policy which would mean distribution of electric light and power to rural population. "There is no doubt," he said, "it is essential in so far as it is practicable that the rural population be supplied with power. There is one feature in connection with it, however, which appeals to me, namely, that it may not be possible—I will not say it is not possible—to carry this to the ultimate conclusion from a practical standpoint. There is a possibility that the estimated cost involved would make the scheme prohibitive. It is evident in the policy advocated by this committee that all of the agricultural interests are to be taken care of. There are certain sections of the province where I feel this could not be done without running into expenses that are uneconomical. The question then is, how far are we going to go with this policy before we run into problems where expenditure involved makes the whole proposition a burden on the province generally. With regard to the report of the government committee, I feel it has been prepared and presented without going into the matter deeply enough. It appears to me that this report is more or less superficial. The question involved is too great to be considered in the manner in which it has been taken up, and I feel that before any action is taken on this proposition that considerably more detailed information and data should be collected and considered."

Another delegate commenting on the report, said: "On page four of this report the committee recommends the taxing of the Hydro-electric system by which the province would derive a revenue of \$500,000 a year. I believe this would be an unwise arrangement. In the next paragraph they say that exemption from taxation is a system of bonusing in its most vicious form. I think the recommendations of the committee that a surcharge be made on certain sections of the province is neither more or less than a system of bonusing—probably in its most vicious form. On page six they take up the question of a comparison between the timber industry and the power development. I don't think

this is at all fair. It is necessary that the Government should derive a large amount from the timber industry, which is destructive in its character, and the Government is required to take steps to re-forest the province. The development of power, on the other hand, instead of being a liability is constructive in character and is really an asset of the province. Again, the report, in some places, is not clear, and leaves one in doubt as to what interpretation to place upon it. For example, on page eleven, last paragraph, one interpretation of this might be that municipalities paying \$30 per h.p. would not have to pay the additional \$2.00. Another interpretation that might be made, is that the additional \$2.00 would not increase the cost as it would be refunded by the government."

Another delegate said: "We are at present cursed in our district with a flat rate, and it looks as if some of you are going to have the same curse put on you. We don't think it right that a town which some years ago had the foresight to put a lot of money into the development of water-powers situated in the vicinity should have to pay as much for power as municipalities which happen to be further from the source. If you are going to start equalizing rates, then northern towns might quite justly claim that freight rates be adjusted so that coal will be as cheap there as at Niagara Falls."

The opinion was voiced by one delegate that it was evident from Mr. Drury's talk before the Electric Club that the Government was determined to put through some sort of legislation dealing with this question, provided they could get a majority. "Mr. Drury," he stated, "said distinctly that he thought the tax of two dollars a horse-power was too great. It has been demonstrated clearly at this meeting that the scheme set forth by this government committee is impossible. I think our criticism, however, has been too destructive in its character. Could we not offer some constructive criticism? I would suggest in line with what the Hydro-electric Power Commission has approved of, that some sort of bonus should be given to the construction of rural lines, but that the cost of power outside of that should not be tampered with; otherwise, if it is interfered with, it will automatically revolve itself into a flat rate."

Another delegate pointed out that in Canada only a small percentage of the average farm was ever cultivated by the farmer. This, he said, was a striking comparison with similar farms in Europe, where the whole farm was inten-

Where are the Signs of Depression?

A summary of the electrical needs of more than two hundred and fifty Canadian towns and cities distributed from coast to coast indicates only 7.3 per cent. saturation on the average. These figures are startling in the definiteness with which they point to vast sales opportunities. Here are the figures:

Houses wired—74.9 per cent.

Degree of saturation of wired homes:

Electric Ranges—3.1%

Elec. Percolators—3.7%

Elec. Vacuum Cleaners—5.0%

Elec. Washing Machines—5.9%

Elec. Dishwashers—.07%

Elec. Water Heaters—1.3%

Elec. Toasters—18.2%

Elec. Air Heaters—4.8%

Sewing Machine Motors—1.2%

Elec. Irons—45.7%

Elec. Ironing Machines—.14%

Elec. Refrigerators—.06%

Elec. Fans—5.4%

sively cultivated. He claimed that if farm life was made more attractive, the farmer's son and daughter might be induced to remain and instead of one house being built on the farm there might be erected as many houses as there were children of the farmer.

Power on the Farms

An interesting account of the work being done by the Hydro Commission in dealing with the case of the farmers was given by Mr. R. T. Jeffery. Among other things, Mr. Jeffery said: "Up to the present the only method of handling power to farmers, was for the township to enter into a contract with the commission, the township then to have individual contracts with each customer. That meant that each township was considered as a unit, and of course that was found to be impracticable on account of power distribution centers not being located in those townships so that each township could be supplied economically. The scheme was killed on that account. To get over that difficulty, and with a view of supplying power to every farmer in the province who wanted it, and was willing to pay the cost of it, new legislation was obtained last year. By that legislation the commission may divide the province into districts without regard to township boundaries, each district being a division in itself, an equal rate to be charged to all farms in that district for the same class of service. To get results from that legislation, during the past year we had men engaged continually making surveys in different parts of the province, finding out what kind of farms were there, and sizing up each farmer as a prospect for power. On the basis of that information a report was made classifying all farms in each township into three classes, good, fair, and poor. The "good" were those whom we thought would, with a reasonable rate, be sure to take power, the "fair" were doubtful, and the poor ones seemed an impossible proposition. We surveyed approximately forty townships with a view to the possibilities of every farm. On the basis of that information we are making estimates on the cost of supplying these farms with power, the idea being to divide each group of townships by an economical boundary. The rates that we will be able to supply that power at are going to be a great deal higher than the farmer has been led in the past to believe he will get that power for. The whole scheme will be approved very soon, and we propose to start a system of public meetings, starting out with those townships that are most insistent on power, and at those meetings we will explain the power scheme of supplying farmers, and also the cost of supplying that power. It has been suggested in some cases that the farmers could help to build the lines.

There are some months in the year when the farmer is slack for work, and he could spend several days in constructing lines if it was to his own benefit to do so. There are several different suggestions. One, that all the lines be built by the government. Another, that the farmers supply the labor and cartage at a certain rate. A third, that the commission supply a working superintendent who would show the farmers how to build the lines, haul poles, dig holes and string the wires, with the exception of tying-in, which would be done by the linemen. On the basis of this last proposal I believe the matter of supplying power to the farmers is quite possible at a very reasonable rate. It is simply up to the farmers to decide whether they want to help themselves. There are going to be districts, however, where it will be impossible to supply power at a reasonable rate for many years to come."

It was pointed out by a delegate that the scheme outlined by Mr. Jeffery was almost the same as that which was in effect in Sweden, where the work was done by the farmer.

A motion was made that the association appoint a com-

mittee to frame a set of resolutions pointing out the defects of the proposed legislation and present it to the legislature. This was objected to, however, by some of the members on the ground that the association was not a political body, and that to pass the motion was outside their jurisdiction. The motion was subsequently withdrawn in favor of one as follows: "Resolved, that this association appoint a committee to send a verbatim report of the discussion on the matter of the report of the committee of the Legislative Assembly on "A More Equitable System of Distribution of Hydro-electric Power, and a More Uniform Rate," to the O. M. E. A., for their assistance in dealing with this report."

On Saturday morning, January 29th, a large number of the delegates visited the laboratory of the Hydro-electric Power Commission of Ontario, before leaving for their various districts.

Sir Adam's View of Committee Report

Following his return from England, Sir Adam Beck attacked the report of the Special Committee of the Ontario Legislature on the question of distribution of Hydro-electric power and a more uniform rate. "The report of this committee would ruin the Hydro enterprises if carried out," declared Sir Adam. He ridiculed the idea that the Hydro scheme was a Provincial liability in any sense, pointing out that the municipalities owned the enterprise, and that it was an investment, not a liability. He pointed out that Ontario paid higher power rentals than did Quebec. In Quebec it was five cents a horse-power, in Ontario it was over forty cents. "I will report to the government that the future of these enterprises is hopeless if this report goes through. It is a physical impossibility to proceed with a rental of \$2 per horse-power, as recommended by the committee. The villages and hamlets will be penalized out of the use of power altogether," Sir Adam declared.

Improved Electrical Railway Reports

The annual report of the British Columbia Electric Railway Company for the year ending June 30th, 1920, showed a slight increase of net profits to \$590,072, as compared with \$519,364 in previous year. This condition was brought about by increased fares and rates which the company was permitted to charge. The position of utility companies is more or less uncertain in the province as the British Columbia Public Utilities Commission has been abolished and in the meantime no properly constituted body appears to exist to which application may be made for adjustment of rates.

The annual report of the Illinois Traction Company for the year 1920 has just been issued and shows a net income of \$1,150,000—a very considerable increase over previous year. The preferred stock dividend was earned about three and one-half times over. During the year the company was granted a number of rate increases in the gas, electric and street railway departments.

The net earnings of the Twin City Rapid Transit Company, the stock of which is widely held in Canada, show an improvement for 1920 over 1919, being \$999,099, as compared with \$788,352. This represents, after payment of preferred dividend, an amount equal to 3.99 per cent. on the \$22,000,000 of common stock, as against 2.63 per cent. a year ago. During the year the Minneapolis Street Railway Company and the St. Paul Railway Company were both granted the right to charge a six-cent fare.

The Northern Electric Engineering Society

A New Association Which Holds Promise of Becoming One of the Most Vigorous Technical Organizations in the Canadian Field

In this issue we have pleasure in introducing our readers to the directorate of the Northern Electric Engineering Society. This association is the latest addition to the technical societies in the Canadian field. It is an idea conceived and fulfilled by the engineering staff of The Northern Electric Company, Limited, Montreal. The extent of its activities and the possibilities ahead of it may be judged by the fact that although only a couple of months old it already has a membership of over two hundred, and that at the first regular meeting some two hundred and fifty members and guests of the society foregathered to hear the inaugural addresses made by Mr. P. F. Sise and Mr. M. K. Pike, respectively the president and general sales manager of The Northern Electric Company.

The objects of the society as set forth in the constitution, are "to promote the interchange of knowledge on engineering subjects" and "to encourage good fellowship and congeniality." In the first steps it has taken to co-ordinate these two objects the society has been singularly successful. In both respects there is naturally a promising field of endeavor, but in the promotion of electrical engineering knowledge the possibilities need no elaboration.

The membership of the society is confined to members of the engineering staff and employees of The Northern Electric Company. Honorary membership is extended to men distinguished in engineering or kindred sciences. The affairs of the society are managed by a council comprised of the president, vice-president, secretary, treasurer, and members of the committee, the last-named being chosen from the various branches of the engineering department—one from each branch. The regular meetings of the society are scheduled for the first Monday in each month.

At the first regular meeting the president of The Northern Electric Company, Limited, Mr. P. F. Sise outlined briefly the history of the engineering department and discussed not only the possibilities that lay before the society in the way of technical discussion and research, but the practical benefits that could be derived from the work by the membership. Mr. M. K. Pike, the general sales manager, in an address on "The Commercial Side of Our Business," presented an array of facts and figures which were illuminating as to the wide range of the company's activities.

At the second regular meeting of the society held last

month, a particularly interesting address was delivered by Dr. A. S. Eve, C.B.E., F.R.S., D.Sc., Director of Physics of McGill University, whose subject was "Science in the War." Dr. Eve was resident director of the Admiralty Experimental Station at Harwich, Eng., during the latter years of the war, and his work in that connection formed the basis of a very interesting paper reported extensively elsewhere in this issue.

Lecture on Electrons

On the last day of January, Mr. W. B. Cartmel, M.A., B.Sc., the company's transmission engineer, delivered an address of much educational value on the subject of "Electrons." Notes on this lecture by the Associate Editor of The Electrical News in Montreal will also be found in another column.

A programme of much interest has been outlined for future meetings. Dr. Louis King, of McGill University, is scheduled to deliver an address on "New Experiments in Electricity and Magnetism." Another treat in store is an illustrated address on "Recent Advances in Telephone Transmission, both Wire and Wireless," by Dr. Frank B. Jewett, chief engineer of The Western Electric Company, Inc., New York. Yet another engineer of wide experience who will address the society in the near future is Mr. R. M. Wilson,

chief engineer of the Montreal Light, Heat and Power Company.

The Personnel of the Society

It remains only to add the desired personal touch to this article by giving a few details concerning the various officers of the society.

Mr. P. F. Sise, B.Sc., (McGill), M.E.I.C., secretary and president of the society, is the president of The Northern Electric Company, Limited. Mr. Sise began his career as a draftsman at the Northern Electric & Manufacturing Company, Limited, in 1904, and in 1910 became assistant managing director of that company. On their amalgamation with the Imperial Wire & Cable Company in 1914, Mr. Sise became vice-president and general manager of the new organization, which bears its present name, The Northern Electric Company, Limited. In 1917 he became president, succeeding his brother, Mr. E. F. Sise. In the late war he went overseas as captain and adjutant of the 15th Battalion. In 1917 he was seconded to the War Office and returned to New York in



(1) W. S. Vipond, president; (2) G. S. Patterson, treasurer; (3) D. W. Whitney, vice-president; (4) T. J. Heaney; (5) N. R. Ashby; (6) I. E. Hamilton, secretary; (7) W. I. Brebner; (8) W. E. C. Irwin.

the staff of Brigadier-General W. A. White. Subsequently he was transferred to the Siberian Expeditionary Force as major and second in command of the 259th Battalion.

Mr. W. S. Vipond, M.Sc. (McGill), is the president of the society. His connection with his company dates back to 1909 when he joined the old Wire and Cable Company as their engineer. This firm was later known as The Imperial Wire and Cable Company, which subsequently amalgamated



Mr. Paul F. Sise, Hon. Pres.

into The Northern Electric Company, in which Mr. Vipond became assistant chief engineer and afterwards cable engineer, the appointment he now holds. Mr. Vipond, too, has a military history, he having served in France as a lieutenant in the Royal Air Force.

Mr. D. W. Whitney, B.E., vice-president of the society, is a graduate of Union College, Schenectady, N.Y. He holds the appointment of chief engineering inspector in this company, with which he became identified last year. He was formerly with The American Telephone and Telegraph Company of New York.

Mr. L. E. Hamilton, B.Sc., the society's secretary, is another U. S. graduate—from the University of Tennessee. Members of the old Montreal Electrical Society will recall Mr. Hamilton as a former vice-president of that body. Mr. Hamilton joined The Northern Electric Company in 1911. He holds the position of engineer in The Telephone Power Equipment Division.

Mr. G. S. Patterson, treasurer of the society, has seen continuous service with his firm since 1907. He is now chief of the manual telephone apparatus and sub-station division.

Mr. W. E. C. Irwin, B.Sc. (McGill), one of the five members of the society's council, has the distinction of having been a major in that glorious unit, the P.P.C.L.I. Mr. Irwin joined The Northern Electric Company upon demobilization, after his return from France. At present he is engineer in the manual telephone apparatus and sub-station division.

Mr. T. J. C. Heeney, M.E.I.C., a member of the council, also joined the company upon his return from overseas, after serving as a lieutenant in the Canadian Engineers. He is now assistant engineer in the paper power and telephone cable division.

Mr. N. R. Ashley, engineer in the company's inspection

department, another member of the society's council, joined the company in 1904. He was formerly identified with their installation and equipment engineering departments.

Mr. W. I. Brebner, another McGill University man, and a member of the society's council, is engineer in the machine switching equipment division. He joined the company in 1910.

Mr. W. D. Bishop, engineer in the commercial power branch, completes the roll of the council of The Northern Electric Engineering Society. Mr. Bishop was formerly on the staff of The Canadian General Electric Company at Peterborough, Ont.

Society Far-reaching In Its Influence

The Northern Electric Engineering Society may be assured of the best wishes and close co-operation of a host of friends in electrical and general engineering circles throughout Canada.

The formation of each educational body of this kind makes for progress in electrical Canada, and in the case of a company with wide ramifications like the Northern Electric, that progress is bound to be far-reaching in its influence.

The meetings of The Northern Electric Engineering Society will be duly chronicled in The Electrical News.

Science in the War

A Review of the More Noteworthy Achievements of Interest to Electrical Men—Piloting Ships from a Submarine Cable—Something About the Geophone and the Hydrophone—Wireless Direction-Finders—Detection of Dead Submarines

One of the most interesting addresses delivered before a body of electrical men in recent years was one given last month by Dr. A. S. Eve, C.B.E., F.R.S., D.Sc., Director of Physics of McGill University, Montreal, before the members of The Northern Electric Engineering Society, a new organization whose personnel and work are the subject of extended mention in this issue. Dr. Eve was resident director of the Admiralty Experimental Station at Harwich during the latter years of the war,—an experience which constitutes unique authority for the subject of this article.

In his introductory remarks, Dr. Eve reminded his audience of the great variety of subjects from which it was possible to make a selection for his lecture, and humorously recalled the story of a woman who went to make a purchase at a drug store. She told the clerk that she wanted some powder. The clerk replied, "Yes, Madam,—powder. Face, tooth, gun, bug, or seidlitz?"

Following are notes from Dr. Eve's address:

Piloting of Ships by Wireless from Submarine Cable

In 1903, when Dr. L. Herdt, of McGill University, was visiting Berlin, he noticed a man walking slowly along the street wearing head telephone receivers connected to two large coils which he carried under his arms. This man occasionally stooped down and made a cross mark on the sidewalk with a piece of chalk.

Dr. Herdt followed the man and inquired what he was doing. The man was testing for a break in an underground cable. When he could not hear a buzzing in his receivers, he knew he must be over the exact spot where the break

had occurred, and so he made the chalk mark for the guidance of the cable repair man.

When Dr. Herdt returned to Montreal he told of this experience and a ten-mile length of cable was laid along the channel of the St. Lawrence River, and connected to a high frequency generator, giving about 500 cycles per second. Large coils were placed on each side of a vessel and each was connected to its associated receiver in a head telephone. The buzzing could be heard distinctly and the vessel was piloted along the winding channel with accuracy.

If the sound were weaker on the left side than on the right, it showed that the course was too far away on the left; when both receivers buzzed equally, the vessel was exactly over the cable.

When our Canadians went into the Great War, one young man told an acquaintance in the navy that the naval men were not "on to their jobs"—that they could not pilot their vessels into port during the night or during a dense fog. If they gave him a chance he could do it at any hour of the day or night, regardless of fog, light or sea.

The naval men did as he directed and laid a cable one mile long in a harbor entrance, connected one end of the cable to a high frequency alternator, placed a coil on each side of the bow of the vessel, and had the new experimenter go down into the hold and give his orders to the pilot.

This experiment was a great success. The young man was immediately sent to the highest authority, and orders were given to lay a cable forty miles long through the mine fields of the North Sea,—seven miles north and thirty-three miles east.

A short space on each side of this path was swept clear of mines, and vessels steaming at 30 knots and slower were soon using this safety path through the fields, which were full of English and German mines.

Timing Mechanism for Firing Bullets Between the Blades of a Revolving Propeller on an Aeroplane

The son of a Roumanian bandmaster named Constantinesco was curious to know what happened to sound waves in air when different keys were depressed on a horn. He computed mathematically the wave lengths and then wondered what would happen to sound waves in liquids instead of in air. He found that the wave travelled much faster in water than in air, and he designed a contrivance to transmit and receive impulses by means of rapid but very slight movements of a piston at each end of a small pipe filled with oil or water.

This invention was applied to the propeller shaft of an aeroplane. Cams were placed between the blades and operated the transmitting piston, which sent the wave along the oil in the pipe to the receiving piston, near the firing pin. The oil was at a pressure of about 60 pounds per square inch, and the impulses continued as long as the propeller revolved, but the actual firing was controlled by the operator, as the firing pin did not respond to the waves until a bulb was pressed by the operator.

Submarine Mines

Submarine mines were developed so that by merely being thrown overboard they would automatically sink 12 feet below the surface of the sea and remain in that position indefinitely.

The spherical float is about a yard in diameter, has explosive horns, and contains a large explosive charge. An automatic cable reel is fastened by cable to the float and by another cable 12 feet long to a weight. Both cables are wound up before the mine is thrown overboard.

First the weight unwinds its 12-foot length of cable, then the weight and reel together begin to travel downward, unwinding the cable between the float and the reel.

When the weight touches the bottom, a latch is tripped in the reel and the cable drum is locked, preventing any more unwinding. The cable reel then settles down 12 feet, resting on the bottom, and the floating mine is submerged 12 feet.

If a strong current is flowing in deep water, the mine may be removed far enough from its usual position, directly above the reel, that its depth may be appreciably more than 12 feet below the surface.

The Geophone

A mechanical device called the geophone, used for detecting sounds through the earth, was used to detect the location of miners tunnelling near or under the listener.

It consisted of two rubber tubes, one from each ear of the listener, each tube connected to its associated diaphragm and holder laid on the earth three or more feet apart.

If the sound was louder in the right ear, the tunnelling was nearer the diaphragm connected to that tube. By shifting only one of these diaphragms, the location and approximate distance could be estimated.

The Hydrophone

An electrical microphone connected to a submarine diaphragm less than a foot in diameter was used for detecting the presence of moving submarines or ships.

This contrivance is called a hydrophone. (Only one



Dr. A. S. Eve

side of the diaphragm is exposed to sound waves in water, the opposite side being protected by a watertight base.

Subsequently a directional hydrophone was obtained, consisting of a carbon button hydrophone in a water-tight case fixed to the centre of a gunmetal diaphragm. Edge on, this instrument secured a minimum of sound from the quarry, whilst a maximum was obtained when facing the source of sound. By placing a baffle plate on one side of the instrument it was rendered uni-directional.

Direction and Range-Finders in Air

Violent sound waves in air, travelling at the ordinary speed of sound, were received on electric microphone transmitters, spaced along three thousand yards in a semi-circle having a radius of about four thousand yards and its centre in the enemy's lines.

These microphones were connected to their associated wires in an Einthoven galvanometer, where a photographic

film was rapidly revolved and a record made of the elapsed time that was taken by the sound in travelling between each of the six stations.

The oscillograph was located about two thousand yards back of the nearest microphone, or about six thousand yards from the front line trench.

Two outposts located near the trench, but far from each other, would signal when a new gun started, so that its exact location could be determined.

West winds interfered with these results. In some cases the sound from eastern guns was blown off the surface of the fighting area, but was heard many miles beyond to the west.

Direction and Range-finders in Water

Sound waves in water travel more quickly than in air, and they are not influenced so much by varying currents,—hence they can be used for more accurate results.

The microphones employed are quite similar to those described under the heading of Hydrophones, and the technique is very much the same as that employed for sound-ranging on land.

By means of wireless a vessel asks its exact position. Then it drops overboard a small explosive charge and asks the question, "Where are we, please?" In a few minutes the exact location is given so closely that this method has been adopted by vessels taking soundings by day, by night, or in a fog. The accuracy is said to be 50 yards in 20 miles.

Wireless Direction Finder on an Aeroplane

Two large aerial coils placed far apart on opposite ends of the wings of an aeroplane, with their axes at right angles to each other, were connected to their respective small fixed coils having the planes of their windings at right angles to each other. A revolving coil provided with a pointer and scale of degrees was pivoted in the space included by the two fixed coils and connected to a head telephone receiver.

Two wireless stations of known location sent out continuous and easily distinguishable waves of short lengths.

By revolving the small movable coil and noting the position of the pointer for the loudest signal received from each station, the angle between the stations was measured, and by referring to charts, the approximate location of the aeroplane was determined.

Wireless Direction Finder for Steamships

As a result of experiments, the Dominion Government employs the "Belloni-Tosi" system of signalling at Canso, Cape Race and Chebuctoo Head, whereby steamships are given their position with regard to these stations.

Hairbreadth Escape of the Crew From a Submerged Submarine

One of the many lantern slides displayed during this address showed the interior of the pilot room of a submarine with an almost incredible mass of apparatus under the control of the navigating officer.

All except one of the crew of a disabled or dead submarine had been shot out of the main hatch and their lives saved one by one by the compressed air rushing out through the open hatch. The air pressure became so weak that the remaining member of the crew had not sufficient strength to open the door. In despair he opened the sea cocks, admitting water until it was up to his neck. This compressed the air remaining in the submarine sufficiently that when he climbed up to the hatch and forced with all his strength against the door it opened, and he was shot out in safety to the surface. His life was thus saved, and the next day he was again on duty in another submarine.

Views of huge fountains caused by mine explosions

were shown. Some of the fountains had the general appearance of a cone, others were long vertical columns, the highest being 630 feet.

After these explosions, thousands of dead fish were picked up by fishermen and birds.

Vacuum Tubes or Valves

The development of vacuum tubes was traced from the "Fleming" valve to those of the most recent English, French, German, and American design. Diagrams and lantern slides were used in this connection.

Northern Electric Engineers Also Hear Lecture on "Electrons"

At a meeting in Montreal on January 31st, members and guests of the Northern Electric Engineering Society were given an interesting lecture on "Electrons" by Mr. W. B. Cartmel, M.A., B.Sc., transmission engineer of the Northern Electric Company. The lecture was plentifully illustrated by means of lantern slides and experiments.

According to the speaker, much of the present knowledge of electrons has been derived from the study of ionization, and it was well established to-day that the matter consists of molecules, which can be divided into atoms, which are themselves composed of particles of electricity, termed electrons.

Continuing, Mr. Cartmel outlined six ways whereby electrons can be separated from matter, and proved by experiment that these were by rubbing (frictional electricity); by heating (thermionics); by the ultra-violet light (photoelectricity); by high potential (Cathode rays); spontaneously, as in radio-activity; and in electron bombardment (Delta rays).

Although Faraday fully investigated the phenomena of electrolysis, the first experimenters of the atomic theory of electricity were Berzelius and Sir Humphrey Davy. It was by means of electrical discharge through gases that the idea of electrons was formed. In the Geissler tube, a vacuum of about one-thousandth part of one atmosphere was obtained by means of an ordinary hand pump. Later mechanical improvements enabled Sir William Crookes to exhaust all but one-millionth part of the air originally contained in the tube, and he observed a stream of Cathode particles in this tube on connecting the two electrodes to a coil and battery.

Roentgen, in experimenting with a Crookes' tube and screen, discovered X rays, which are due to the impact of electrons on the anti-cathode. The electron bombardment sets the electrons of the atoms in violent motion, and these in turn set ether in vibration. In the experiment of Sir W. Crookes, it was observed that at the pressure of one-millionth part of one atmosphere, a phosphorescent light is distributed over the surface of the glass tube. Scientists began to wonder if this phosphorescence were not the actual cause of Roentgen rays, and on this hypothesis, which we now know is wrong, they began to look for, and experiment with phosphorescent substances. Edmund Becquerel hit upon uranium, which has an atomic weight of 238, this being the heaviest atom known. Professor Rutherford found that uranium radiates alpha, beta and gamma rays. Prof. and Mme. Curie, in their search, discovered polonium, and then radium.

By means of the Spintharoscope, Sir W. Crookes was able to observe the discharge of alpha particles from radium. It has also been observed that helium is produced from the alpha particles, so that spontaneous transmutation is now known to occur. It has been possible to verify and add to

Mendeleeff's table of atomic weights by the help of the electron theory.

Professor Millikan, of Chicago University, in recent experiments, has calculated the mass of the electron by means of an apparatus where a minute particle of oil was observed while picking up electrons. We have been told that there is a charge of 6.282 million million million electrons in a condenser of one micro-farad capacity with a potential of one volt. Mr. Cartmel showed how this figure was arrived at.

The study of the electron will lead to an epoch-making advance in the field of electricity and in the world of science generally, concluded the lecturer.

Canadian National Telegraphs

The Amalgamation of Three Systems Now an Accomplished Fact Under Management of Mr. Geo. D. Perry

With the extension of Government control of railways it has necessarily followed that the telegraph systems of the Canadian Northern Railway and Grand Trunk Pacific Railway should come under Government control. Fortunately, however, to a very large extent, the same officers that have made the private organizations a success, have been retained by the Government in the same official capacities. This has been particularly true in connection with the correlation of the



Mr. Geo. D. Perry

Great North Western, Canadian National Railway and Grand Trunk Pacific telegraph systems, which in future will be known as the Canadian National Telegraphs, and which will be operated under the management of Mr. George D. Perry, formerly general manager of the Great North Western Telegraph Company.

The history of telegraph operations in Canada has been one of continued development and Mr. Perry is one of the outstanding figures. He has been general manager of his company since 1911, succeeding Mr. Isaac McMichael who, in turn, succeeded Mr. H. P. Dwight, the first general manager of the company. In 1915, the G. N. W. was acquired by the Canadian Northern Railway and the commercial telegraph system of the two companies together resulted in what was practically a Dominion-wide organization. Now, by the last

move of the Canadian Government, we have an amalgamation of the three systems under the name, the Canadian National Telegraphs and Mr. Perry becomes the general manager.

It is recognized by those who know Mr. Perry that he receives this important appointment in virtue of his capacity for hard work, coupled with an unusual ability. During the early years he worked himself up, step by step, and at one time held the dual position of secretary and treasurer. In the little spare time at his disposal Mr. Perry devotes his energies whole-heartedly to the furtherance of the interests of different phases of the industry with which he is associated. As an example he is president of The Electric Club of Toronto and at the recent International Communications Conference held at Washington he was the representative of the Canadian Government.

Mr. Perry is fortunate also in surrounding himself with efficient officials, the principal of these at the moment being A. C. McConnell, secretary and auditor; D. E. Henry, treasurer; Chas. E. Davies, general traffic superintendent and W. G. Barber, general commercial superintendent.

Vast improvements have been made in recent years, under Mr. Perry's regime, in the matter of installing the most modern telegraph apparatus, operating the way circuits by selector or concentration units, and the trunk circuits by Morse or Automatics, which comprise 5 three channel multiplex printer circuits, 14 duplex Morkrum printer circuits and 23 Morse duplex circuits.

Three channel multiplex printer circuits are operated between Montreal and North Sydney Cable Station, New York, Toronto and Winnipeg, also Toronto and Winnipeg. With this apparatus it is possible to transmit three messages automatically printed in both directions simultaneously on one wire, thereby greatly increasing the capacity of a wire compared with the Morse duplex or quadruplex method which is capable of only two messages in both directions at the most. Selectors are installed on these circuits at all repeater stations so that the terminal offices can signal repeater attendants to the circuit in a few moments. The new facilities proposed for the coming year, will add 4 three channel multiplex printer circuits and 5 Morse duplex circuits. In connection with this immense chain of equipment, there are some 31,000 miles of pole line and 114,000 miles of wire.

The head office of the new system remains in Toronto, the executive staff occupying commodious quarters in the World Building on Richmond Street West, while the local office, the operating staff and the Commercial News Department remain at the old building on Wellington Street East.

The City of Valleyfield, Vt., is exempting the corporation of a by-law passed by the city granting a commutation of taxes to the Montreal Cotton Company, for the period of twelve years. The company is to pay a fixed amount of \$21,000 per year for all its mills, including the repair shops, and the power houses of the Valleyfield Electric Light Company. In exchange for this tax concession the company is to supply the city free an amount of 125 h.p. of electric energy for lighting the streets of the city, the municipal buildings, and as a motive power for industrial use of the corporation, as well as lighting at a moderate price for the citizens generally. Another clause of the contract provides that the company must sell the city electric current up to 1,000 h.p., at the rate of \$25 per h.p.

Messrs. Booth Bros. 416 McMillan Avenue, Montreal, have been awarded the contract for electrical work on 800 and apartment house being erected on Avenue Royal.



Electric Railways

A Successful Convention of Canadian Electric Railway Men

For the First Time Private and Municipal Operators Meet and Discuss Common Problems

During the first week in February the convention of the Canadian Electric Railway Association was held in the Chateau Laurier, Ottawa. This was their 17th annual convention, but it was different from all previous conventions in that municipal railway systems from all over Canada had been invited to be in attendance and take part in the discussions. This invitation to municipalities followed as a result of a change made in the constitution at the association's last annual meeting, when it was decided that it would be to the advantage of railway men in general if larger numbers and a more general representation could be gathered together to read and discuss papers relating to electric railway matters.

The Constitution

According to the revised constitution, which was finally adopted at the Ottawa convention, members now consist of active, honorary and associate members. The active members are the electric railway systems of the Dominion of Canada, each system being entitled to one vote at the association's meeting by a delegate presenting proper credentials. Honorary members may be elected by a vote of the active members of any persons who may have performed outstanding services in the Canadian electric rail-

way industry; honorary members are not entitled to a vote. Associate members consist of firms or persons engaged in the manufacture or sale of electric railway equipment or supplies; they are not entitled to a vote at the association's meetings.

The constitution provides that the annual fee for active members shall be \$100, and for associate members \$50 a year; honorary members to not pay a fee. Active members may also be called upon for extra disbursements, in which case the allotment is in proportion to the gross earnings of the systems.

The Opening Session

During the morning of the first day of the convention the delegates and guests registered, listened to an address of welcome by the Mayor of Ottawa, supplemented by an address by the president of the association, Mr. A. Gaboury. The acting secretary-treasurer, Mr. A. Eastman, also presented his report which was accepted by the association as a very satisfactory one.

A luncheon of the delegates was held at 1.30, the president in the chair.

Three Practical Papers

The afternoon paper consisted of three papers: (1) "Practical Operation of Service at Cost Contract," by Col. J. E. Hutcheson, general manager of the Montreal Tramways Company; (2) the "Safety Car," by J. C. McCune of the Safety Car Device Company, New York, and (3) "Adaptability of the Safety Car to Canadian Snowy Climate." Col. Hutcheson's paper is reproduced elsewhere in this issue.

The Safety Car came in for a great deal of favorable comment. Mr. McCune illustrated its construction and operation by moving picture films, and gave operating figures to show the economies that can be effected in its operation as compared with heavier types of rolling stock.

Mr. Weyman, who is manager of the Levis County



Mr. Geo. Kidd, Hon. Vice president



Mr. T. Ahearn, Hon. President



Mr. G. Gordon Gale, elected president Canadian Electric Railway Association

Railway, illustrated his paper by lantern slides. Some of these showed the little Safety Car with the snow piled at the sides of the streets higher than the car itself, and yet, Mr. Weyman claimed that they had been able to operate these cars throughout the whole winter of the past recent years with less trouble than had been the case when they were operating larger cars.

Banquet at Hull Golf Club House

In the evening the delegates adjourned "en masse" to the Hull Golf Club house under the genial direction of Mr. G. Gordon Gale, vice-president and general manager of the Hull Electric Company, and his brother, Mr. A. V. Gale. On this occasion Col. J. E. Hutcheson presided. In addition to a delightful menu the entertainment consisted of songs and speeches, addresses being made in response to the various toasts by Mr. Thos. Ahearn, Major F. D. Burpee, Mr. H. H. Couzens, Mr. G. Gordon Gale, Mr. Acton Burrows, Mr. Norris, the Mayor of Ottawa, and others. The trip from the Chateau to the club house, as well as the return, was by special car service provided by the Hull Electric Company.

Tuesday Morning's Papers

During the forenoon of the second day a paper was read on "Publicity and Public Relations." This had been prepared by A. W. McLimont, vice-president and general manager of the Winnipeg Electric Railway Company, Winnipeg, but in Mr. McLimont's absence was read by Mr. Eastman. This proved one of the most interesting papers read during the convention, and was followed by an unusual amount of discussion. The second paper was by R. M. Reade, superintendent Quebec Railway Company, on "Accident Prevention Everybody's Business," supplemented by an address by H. B. Morley, general manager of the Ontario Safety League. The reading of a paper on "Standard Traffic Rules," prepared by Mr. Gaboury, president of the association and superintendent of the Montreal Tramways Company, had to be held over, but copies of Mr. Gaboury's paper were distributed so that its usefulness may not be lost.

Officers for 1921

At the termination of the morning session, which also ended the convention proper, the nomination committee brought in its recommendation for officers for the ensuing year. Their recommendation was accepted with minor changes, and was finally adopted as follows: Honorary president, Thomas Ahearn, president Ottawa Electric Company; honorary vice-president, Mr. Geo. Kidd, general manager British Columbia Electric Company, Vancouver, B.C.; president, Mr. G. Gordon Gale, vice-president and general manager Hull Electric Company, Hull, Que.; vice-president, Major F. D. Burpee, manager Ottawa Electric Railway Company, Ottawa. Executive: the above named officers and Mr. R. M. Reade, Quebec; Mr. H. H. Couzens, Toronto;

Mr. C. C. Curtis, Cape Breton; Mr. C. L. Wilson, Toronto; Mr. E. P. Coleman, Hamilton; Mr. A. W. McLimont, Winnipeg; Mr. W. S. Hart, Three Rivers, Que., and Col. G. C. Royce, Toronto. Mr. A. Gaboury was appointed treasurer and Mr. H. E. Weyman, of Levis, Que., auditor. By a clause in the constitution the secretary is appointed each year by the president, this with a view to having the president and secretary in close touch with one another.

Following the adjournment of the convention a number of the delegates assembled before the hotel at the request of the photographer. (See result herewith). The new executive was entertained at luncheon by the president, while the manufacturers' representatives held a little luncheon of their own to become better acquainted and appoint a committee of three to co-operate with the executive proper of the association. At this luncheon Mr. Donald M. Campbell, the veteran president of the Preston Car and Coach Company, presided.

During the afternoon the delegates were the guests of Major Fred Burpee and the officials of the Ottawa Electric Company and were shown some of the newest street switching devices that have been installed at the Rockcliffe sheds. Later a tour was made of the plant of the Ottawa Car Manufacturing Company, where Mr. W. H. McIntyre and his staff explained the latest developments in Canadian street car design.

The convention was generally voted the most successful held in years, due partly to the unusual interest taken by the members in the proceedings. Up to the present time only active members were admitted to the sessions, manufacturers' representatives not being admitted. It was evident on all sides, however, that the new arrangement was equally favored by the active and associate members, and we believe that attendance in greater numbers and greater activity and enthusiasm may be looked for in conventions in the future.

If we might offer a word of suggestion, it would be that special efforts be put forth to obtain the co-operation of municipal electric railways during the coming year. Municipal men have shown themselves capable of unusual enthusiasm and wonderful convention activity, and if their united co-operation can be obtained for next year's convention, work of a high efficiency and helpful nature could be accomplished. The Canadian Electric Railway Association will measure its success largely in proportion as it adds to its numbers those systems which at present are not associated with it and have not therefore derived the benefits which naturally follow an open and free discussion of the problems of the railway men.

It will not be possible to reproduce all the papers that were read at the convention in this issue of the Electrical News, but in the near future, and as space permits, we hope to give our reader the benefit of the information contained in them. They were all unusually excellent papers.



A group of delegates to the Ottawa Convention of the Canadian Electric Railway Association

Practical Operation of a Service-at-Cost System of Street Railway Operation

Interesting Results of Two Years' Operation of Montreal Tramways, Outlined
by Col. Hutcheson Before the Annual Convention of
Canadian Electric Railway Men

When the contract between the city of Montreal and the Montreal Street Railway was made in 1892, the area of the city to be covered by the said contract was 9 square miles, and the population to be served 216,000.

Contracts, dated 1891, with the municipalities of St. Cunegonde and St. Henry, for a period of 50 years, were then in effect.

Subsequently, from time to time, contracts were made between the Montreal Street Railway (or other Companies absorbed by it) and twenty-seven other municipalities, twenty of which were terminable between 1920 and 1961 and seven interminable.

Since 1892, fourteen of the above municipalities have been annexed to the City of Montreal, making the area of the City, in 1917, 50.24 square miles, and the population to be served, 900,000.

In the outside municipalities zone fares were collected which would yield to the Company from five to twenty-five cents per passenger. The maximum fare, under the City contract, was five cents, with reduced rates by tickets.

Contracts made twenty-five to thirty years ago, when the industry was in the experimental stage did not provide for conditions that were constantly changing because of the rapid growth of the community, due to a large extent to the facilities for transportation given by electric railways. An indication of the growth of the Street Railway business in Montreal is shown in the statement of Assets and Liabilities of the Company for the years 1892 and 1920.

The wonderful development of the City between 1910 and 1917, brought many demands from the public for extensions and improved service. These were complied with by the Company to a very reasonable degree and far beyond the contract requirements. However, satisfactory relief could not be given unless new extensions were made in annexed territory, and the City not having a contract covering this territory could not call upon the Company to build.

This led to negotiations between City and the Company, and several conferences were held between 1910 and 1917 with the object of making a new contract to cover the entire system, but because of the hostile attitude of certain members of the civic government no progress was made.

Many prominent citizens appealed to the Provincial Legislature to have the matter taken out of the hands of the Civic authorities and placed with a Commission of business men who would study conditions and prepare a contract that would safeguard the interests of the City of Montreal and of the shareholders of the Company.

In 1917, the Legislature appointed a Commission of five who immediately commenced study of the question, and after hearing the views of the municipalities interested and of public bodies of the City, such as the Board of Trade and the Chamber of Commerce, it was decided that a franchise on the "Service-at-cost" plan was the most equitable basis upon which street railway contracts could be made.

Up to this time the Company had not felt the stress of the war, but because of the necessity of heavy financing to build and equip extensions, was agreeable to negotiate on this basis.

The Commission took several months to study the sub-

ject and visited many cities in Canada and the United States, during which time a valuation of the Company's physical assets was made.

A contract was finally entered into on January 28, 1918, and was ratified by the Quebec Legislature and became effective on February 9, 1918, for a period of 35 years, expiring March 24, 1953.

The important features of this contract provide:

1. For the appointment of a Commission of Control by the Legislature (designated as the Montreal Tramways Commission) composed of three members for the purpose of administering the affairs of the contract, and that an appeal can be taken from any decision of the Tramways



Col. J. E. Hutcheson, Gen. Man. Montreal Tramways Company

Commission to the Quebec Public Service Commission whose decision shall be final except on questions of law.

2. For the establishment of a Guarantee Fund, by the Company, of \$500,000.00 in amounts of not less than \$100,000.00 per annum, to be used to meet all liabilities incurred by the Company, prior to the coming into force of this Contract, and to provide for the payment in each year of any portion of excess expenditure hereinafter referred to. Also for the payment of any penalties imposed on the Company, and to guarantee the fulfilment of all obligations assumed by it under this Contract.

3. For the disposition of Gross Revenues in the following order:

1. Operating Expenses and Taxes.
2. Maintenance and Renewals Fund.
3. Return upon Capital Value.
4. City Rentals.
5. Contingent Reserve Fund.
6. Division of Surplus on basis of 20% to the Company, 50% to a tolls reduction fund, and 30% to the city.

It also provides that if at the end of any year, the amount in the Tolls Reduction Fund shall exceed One Million Dollars, the Commission may, and whenever the amount in the

said Fund shall exceed Two and a Half Millions, the Commission shall reduce the fares or tolls on the Tramways System.

4. Operating Expenses and Taxes

The Commission are required to fix each year an allowance per car mile to be used for the payment of all Operating Expenses (exclusive of Maintenance, Renewals and Depreciation) and all taxes levied against the Company or its property, and in so doing it shall base its action, on the actual and necessary expenses incurred during the preceding year, with such adjustments as may be foreseen to be necessary on account of modifications of service, changing costs, or any circumstances tending either to increase or diminish the necessary expenses of operation.

5. Operating Profit

If at the end of any year the Commission shall find that the Company has kept within the Operating Allowance, or has not exceeded same by more than $2\frac{1}{2}\%$ of its amount, they shall permit the Company to take out of Gross Revenues, as a charge prior to all other charges (except Operating Expenses and Taxes) a sum equal to $\frac{1}{8}$ of 1% of the total average Capital Value, for that year, which shall belong to the Company. Should the Company's expenditures exceed the Operating Allowance, plus the above mentioned $2\frac{1}{2}\%$ during any year, the excess over such allowance and percentage shall be known as Excess Expenditure and shall be taken from Gross Revenues, up to an amount not exceeding $\frac{1}{8}$ of 1% of the average Capital Value for such year, and the Operating Profit shall be reduced accordingly. If the excess expenditure exceeds the $\frac{1}{8}$ of 1% mentioned above, the Company shall receive no Operating Profit, but shall pay out of the Guarantee Fund the amount by which the Excess Expenditure exceeds the $\frac{1}{8}$ of 1%. The Company has the right, however, in anticipation of such excess expenditure to submit to the Commission a detailed statement in explanation thereof, at any time during the year, or immediately upon the close of the year. If the Commission finds within 60 days after the close of the year that the excess expenditure, or any part thereof was necessary or unavoidable, it shall permit the Company to take out of Gross Revenues the additional amount required to cover the excess expenditure, or any part thereof, and shall award the Company the full amount of the Operating Profit.

6. Maintenance and Renewals Fund

It is provided that the entire plant and property of the Company, shall, at all times, be maintained at the highest standard of operating efficiency, and for the purpose of maintenance, renewals, replacements and substitutions made necessary by wear and tear, age, obsolescence, inadequacy, accident or other cause, a sum is set aside per revenue car mile and is known as the Maintenance Allowance. If at the end of any year it shall appear to the satisfaction of the Commission that such Maintenance Allowance is insufficient, it shall be increased for the ensuing year, and from year to year as may be necessary. If, on the other hand, the Commission shall find that the Maintenance Allowance is excessive, or that the Maintenance and Renewals Fund is larger than prudent management requires, it may reduce such allowance to any extent it may see fit, provided it shall not be reduced as to cause a reduction in the Maintenance and Renewals Fund, except temporarily, below the sum of \$500,000.00. Should the fund be so reduced below such sum, then the Commission shall increase the Maintenance Allowance in an amount sufficient to restore the Fund to at least the sum of \$500,000.00.

7. Return Upon Capital Value

The Capital Value of the Company as on December 31st, 1917, was fixed at the sum of \$36,286,295.00, and it is pro-

vided that the Company shall receive in quarterly payments, a sum equal to 6% per annum on such value, as well as on all additional capital expenditures made from that date. It also provides that during the continuance of the War, or within two years after its close, the Company shall receive an additional return of 1% per annum on additional capital expenditures, such return not to be paid for a period extending more than five years beyond the close of the War. On all monies furnished by the Company for Working Capital, it shall receive interest at the rate of 6% per annum. It shall also receive for the purpose of covering the expenses to be incurred in procuring additional capital, a sum of \$181,431.47 annually, which is the equivalent of $\frac{1}{2}$ of 1% on the sum of \$36,286,295.00. It is further provided that this sum shall be expended solely for the purpose of discounts and commissions, printing and engraving, exchange, legal and other expenses incidental thereto, when issuing bonds or debenture stock, when issuing stock, for printing, engraving, transfer and registration fees, and listing on stock exchanges. Any surplus in this account, as well as the interest on the income therefrom shall belong to the Company, but shall be kept in a special account and not distributed until the termination of the Contract.

8. City Rentals

It is provided that the City shall receive over and above all other amounts to which it may be entitled under the Contract or otherwise, the sum of \$500,000.00 per annum, payable quarterly.

9. Contingent Reserve Fund

It is provided that the sum of 1% of the Gross Revenues be paid annually into a Contingent Reserve Fund, until it shall reach the sum of \$500,000.00. Such Fund shall be used whenever it may be necessary to make up any deficiency in the payments to be made under paragraphs one to four hereof, inclusive, in the order of priority herein established. The allowances provided for in such paragraphs and in this paragraph are to be cumulative in the order established.

10. Insufficient Earnings

If the Gross Earnings are insufficient in any year to provide the sums payable under accounts one to five inclusive, and if the amount in the Contingent Reserve Fund is less than \$300,000.00, it is provided that the Commission shall appropriate from the Tolls Reduction Fund, the amount necessary to bring the Contingent Reserve Fund up to \$500,000.00, all deficits provided under accounts one to four inclusive being made up. In the event of there not being sufficient monies available in the Tolls Reduction Fund, then the Commission shall forthwith increase the tolls to the extent necessary to provide at least sufficient Gross Revenue to meet all the demands provided for under accounts one to five inclusive.

RESULTS OF OPERATION UNDER CONTRACT

From the date of the coming into force of the Contract, February 9th, 1918, to October 3rd, 1918, the Company continued to operate under the rates of fare in existence at the time the new Contract was entered into, which were—

- 5c. Cash.
- 6 Tickets for 25c. (Good 5 a.m. to midnight).
- 25 Tickets for \$1.00 (Good 5 a.m. to midnight).
- 8 tickets for 25c. (Good 5 a.m. to 8 a.m. and 5 p.m. to 7 p.m.)
- 10 Tickets for 25c. (Scholar every day, 5 a.m. to midnight)
- 10c. Cash after midnight.

Zone rates for outlying territory.

The results obtained from the above rates of fare for the

period from February 10th to September 30th, 1918 (7 2-3 months) were as follows:—

Passenger Earnings	\$4,771,662.34
Miscellaneous Earnings	102,269.12
Gross Earnings	\$4,873,931.46
Operating Expenses and Taxes ..	2,800,810.66
Maintenance and Renewals	745,347.55
Return on Capital Value	1,421,163.43
Financing Allowance	115,279.41
City Rentals	317,694.03
Contingent Reserve Fund	48,739.31
Total Charges	\$5,449,034.39
Shortage	\$ 575,102.93
Revenue Passengers Carried	116,571,723
Car Earnings per Passenger	4.09c.

New rates of fare established on October 3rd, 1918, and continued in force until October 26th, 1919, were as follows:

- 6c. Cash.
 5 Tickets for 25c. (Good 5 a.m. to midnight).
 6 Tickets for 25c. (Good 5 a.m. to 8 a.m.) (Good 5 p.m. to 7 p.m., Sundays excepted).
 7 Tickets for 25c. (Good 8 a.m. to 6 p.m., Sundays excepted).
 15c. Cash of Tickets after midnight
 and other rates for outlying territory.

The results obtained from these rates of fare from October 1st, 1918, to October 31st, 1919 (13 months) were as under:—

Passenger Earnings	\$9,706,967.77
Miscellaneous Earnings	185,557.70
Gross Revenue	\$9,892,525.47
Operating Expenses and Taxes ..	5,699,287.01
Maintenance and Renewals	2,074,370.88
Return on Capital Value	2,425,309.81
Financing Allowance	196,550.76
City Rentals	541,666.69
Contingent Reserve Fund	98,925.26
Total Charges	11,036,110.41
Shortage	\$1,143,584.94
Revenue Passengers Carried	201,919,820
Car Earnings per Passenger	4.80c.

On October 26th, 1919, the rates of fare established which continued in force until September 1st, 1920, were as follows:—

- 7c. Cash.
 5 Tickets for 30c. (Good 5 a.m. to midnight)
 44 Tickets (book) for \$2.50 (Good 5 a.m. to midnight).
 Book tickets cannot be purchased on cars, only at Company Offices.
 7 Tickets for 25c. (Scholar) 8 a.m. to 6 p.m. (Sunday excepted).
 15c. Cash after midnight
 and other rates for outlying territory.

The results obtained from these rates of fare from November 1st, 1919, to August 31st, 1920 (10 months), were as under:—

Passenger Earnings	\$9,303,153.82
Miscellaneous Earnings	187,931.64
Gross Revenue	\$9,491,085.46
Operating Expenses and Taxes ..	5,094,722.81
Maintenance and Renewals	1,878,112.21
Return on Capital Value	1,895,672.42
Financing Allowance	151,192.89

City Rentals	416,666.66
Contingent Reserve Fund	94,910.85
Total Charges	9,531,277.87
Shortage	\$ 40,192.41
Revenue Passengers Carried	159,030,043
Car Earnings per Passenger	5.85c.

On September 1st the rates of fare established and presently in force were as under:—

- 7c. Cash.
 4 Tickets for 25c. (Good 5 a.m. to midnight).
 50 Tickets for \$3.00 (Good 5 a.m. to midnight).
 Book Tickets cannot be purchased on cars, only at Company's Offices.
 7 Tickets for 25c. (Scholar) 8 a.m. to 6 p.m. (Sunday excepted).
 15c. Cash after midnight.
 and other rates for outlying territory.

The results obtained from these rates of fare from September 1st to November 30th (3 months) were as under:—

Passenger Earnings	\$2,907,094.70
Miscellaneous Earnings	81,764.35
Gross Earnings	\$2,988,859.25
Operating Expenses and Taxes ..	1,537,878.07
Maintenance and Renewals	588,959.13
Return on Capital Value	571,402.46
Financing Allowance	45,357.87
City Rentals	125,000.01
Contingent Reserve Fund	29,888.60
Total Charges	2,898,486.14
Balance	\$90,373.11
Revenue Passengers Carried	47,741,940
Car Earnings per Passenger	6.09c.

Expenses

While substantial increases have been made in the Gross Revenues of the Company, the expenses have also increased. During the first period the charges to be met out of revenue amounted to a daily average of \$23,386.41, against an average daily revenue of \$20,918.16. During the second period the average daily charges amounted to \$27,868.96, an increase of 19% over the previous period and were in excess of the average daily revenue by the amount of \$2,887.84 per day.

During the third period the average daily charges amounted to \$31,456.36, an increase over the previous period of 12%, and were in excess of the average daily revenue by the amount of \$132.65 per day.

During the fourth period ending November 30th, 1920, the average daily charges amounted to \$31,851.50, an increase over the previous period of 1.26%, and were less than the average daily revenue by the amount of \$553.55 per day.

Increase in the wages of employees which were to a large extent responsible for the increased charges were granted as under:—

Effective June 1st, 1918—Approximate amount of increase for one year 22%, or	\$ 700,000.00
Effective July 1st, 1919—Approximate amount of increase for one year 28%, or	1,100,000.00
Effective July 1st, 1920—Approximate amount of increase for one year 17.4%, or	815,000.00

From the coming into force of the Contract, February

10th, 1918, to June 30th, 1920, the end of our last fiscal year, the results obtained are as follows:—

Gross Earnings	\$22,354,680.57
Operating Expenses and Taxes	\$12,583,161.61
Maintenance and Renewals.....	4,288,678.24
Allowance to Company	5,795,411.81
Total	\$22,667,251.66
Balance—Dr.	\$ 312,571.09
Payable when earned:—	
City of Montreal Rental	\$ 1,192,694.05
Contingent Reserve	223,546.80
	1,416,240.85
Shortage	\$1,728,811.94

It will be seen that while the present rates of fare have produced a margin of revenue over expenses for the three months they have been in force, there is a considerable shortage resulting from the previous operations at the lower rates of fare to be made up. It is hoped, general conditions permitting, that this shortage can be gradually made up without the necessity of any radical increase in the present rates of fare.

STATEMENT OF OPERATIONS

From July 1st, 1919, to June 30th, 1920

Gross Receipts	\$10,782,470.09
Operating Expenses and Taxes ..	\$5,849,911.89
Operating Profit	46,606.68
Maintenance and Renewals	2,190,557.43
Interest on Capital Value	2,177,177.70
Interest 7% on Additions	69,827.46
Interest 6% on Working Capital ..	23,832.96
Financing Expense	181,431.47
City's Share	500,000.00
Contingent Reserve Fund	107,824.70
Total Expenses	\$11,147,170.29
Deficit	\$ 364,700.20

After more than two years' trial it is my belief that the plan now in operation in the City of Montreal is working out to the advantage of the citizens. It is true that the rates of fare have been increased, but had they not, the Company would have been obliged to greatly curtail the service and defer maintenance in order to make the revenue pay operating expenses.

Notwithstanding the deficits of 1918, 1919 and 1920, the Company never for one day deprived the public of the customary good, clean and up-to-date service. In this way we held the good will of our patrons who are perfectly willing to pay whatever satisfactory transportation costs.

Street Railways throughout the country, like steam railroads, have been placed in a critical position over which the management had no control. The rates in effect, prior to the war, while sufficient to at least pay expenses were found woefully inadequate, after the year 1916, to provide for the service the public demanded, and maintain their property in anything like proper condition.

In this regard I would call attention to the table of Traffic Statistics of the Montreal Tramways Company, from 1910 to 1920, shown herewith, which indicates Operating and Maintenance expenses increasing from 16.7 cents, in 1910, to 35.33 cents per car mile for the year ending June 30, 1920. This will be further increased in 1921 to 40 cents per car mile, due to an increase in wages made July 1, 1920.

It is true that relief has come to many companies by

Public Utilities Commissions granting increased fares, but action was so long delayed, due to hostile public sentiment, that many properties were forced to cease operating or to fall into the hands of Receivers. During the year 1920, 450 miles of electric railways were dismantled and 308 miles abandoned.

A report just completed shows that 548 cities in Canada and the United States, representing more than 90% of the riding population, are paying fares ranging from 5 cents, with one cent for transfer, to a flat rate of 10 cents. The largest groups are:—

Cities paying 10 cents.....	112
Cities paying 9 cents	6
Cities paying 8 cents	6
Cities paying 7 cents	174
Cities paying 6 cents	124

Conditions, which I have referred to, have tended to break down the credit and stability of the electric railway industry. Unless the confidence of investors in the securities of Public Utilities is restored, the public must, in some way, assume the responsibility and provide funds for the carrying on of an essential public service. Lack of confidence in public utilities investments, at the present time, is very serious, embarrassing the companies and depriving the public of adequate or satisfactory service.

The question then is, whether the need for local transportation can best be met by public ownership and operation, or by private ownership and management with public control.

If the public was convinced that municipal government is qualified to carry out the management of public utilities it would probably ask that this be done, and I would say that there should be no objection provided a fair valuation of the property is allowed.

It is my opinion, however, that the operation and development of a street railway property requires men trained in the arts and science of the business, and who are absolutely free from local political influence, to handle the many problems of the service.

Municipal ownership is urged by some as a panacea against increased fares. It does not matter by which plan the street railway is managed, the cost of the service must be found, either from those who use the cars or by taxation.

For this reason I believe the public interests would be better served by private ownership and management with public control appointed by Dominion or Provincial authority.

Under this plan the public pays for the service it gets, the rates of fare to be automatically adjusted, up or down, to meet changing operating conditions.

The principal features are:—

- (a) Fair valuation of property
- (b) Fair return on capital value.
- (c) Private ownership and management
- (d) Public supervision and control.
- (e) City's right to purchase at any time upon an agreed basis.

The fundamental basis of a "Service-at-cost" contract is a fair valuation of the physical assets of the Company.

In conclusion, I would say that it is plainly evident that whether the public shall decide to operate its railways—whether it assumes greater control over them, or whether it allows them to remain in the hands of private individuals, the revenue must be such as to provide for the full cost of service.

It costs a lot of money to run street cars under present conditions, and in my opinion the logical way to get it is from fare boxes.

The Electrical Contractor

Toronto Contractors and Dealers Told of Work of National Association of the States

A valuable address was given by Mr. W. H. Morton, manager and secretary-treasurer of the National Association of Electrical Contractors and Dealers before the Ontario Association of Electrical Contractors and Dealers, Toronto District, at their regular monthly meeting held in the Hotel Mossop on Feb. 5. The subject of Mr. Morton's address was "The Work of the National Association."

In introducing his subject, Mr. Morton pointed out that the success of the National movement depended on the local organizations. "The local or district meeting, we consider, is the key to the national movement. The work must be done here. The national organization lays the plans and directs the energies of the whole organization, but the work must be done by the individual member of the district unit." This was the message running through Mr. Morton's entire address. Continuing he said:

I am going to try to cover as briefly as possible the National Association work, and to do so I will have to use statistics to some extent. The National movement started in New York in '87. As a result of that a state association was formed in '89. Such benefit was felt from that association that in 1901 we issued a call for a meeting in Buffalo to discuss the question of whether a national organization in our trade was an advantage. At that time contractors were hardly recognized and dealers were practically unknown. We circularized the country as to the sentiment, with the result that we called a meeting at which 48 people were present, and from the discussion at that meeting we decided it was necessary that a national organization be created. At that meeting in Buffalo, in 1901, the keystone was laid by these 48. Thirty-six of these men are still living and in the association. In fact, we have lost none of the originals out of that association, except those removed by death and other unavoidable causes. The old organization was criticised for lack of results, but it should be remembered in this connection that at that time co-operation was not known. We had to devote our time to educate people to treat each other even decently.

What Has Been Accomplished

The following are a few of the accomplishments of the old organization. We got representation on the Board of Underwriters in 1903. In 1906 we recognized for the first time that some of our members were retailers, by changing the by-laws. In 1910 Canada was first represented in the association by Mr. W. B. Shaw. In 1911 we started co-operative work with the N.E.L.A. In 1912 we worked out a standard conduit size chart and universal estimate sheet. In 1913 the first system of book-keeping was published. In 1914 we obtained liability insurance. In 1917 the entire association was re-organized. This was largely due to the work done by W. L. Goodwin.

The work of our committee resulted in the present form of the National Association. It is a "home rule" organization

at the present time. The association is divided up into divisions and each division into locals, such as I am addressing to-night. At the same time they changed our dues, putting them on the basis of each member paying a percentage on the amount of business done. That has been criticized due to the fact that we changed from a flat rate, but I think it is the fair way of handling an organization of that kind. The larger the man's business the more he gets out of his organization, consequently the more he should give to the association. The dues are based on a rate of one-fortieth of one per cent. The work of the association is carried on through an executive committee which has direction of all the activities. You can't realize the amount of thought and work the executive committee is required to put forth. That work is all donated. I think sometimes the members lose sight of the work done by the National Executive Committee and the standing committees.

The Work of the Committees

The work of the various committees is briefly as follows: First, there is the Architectural and Engineering Committee which negotiates between the National Association and the engineering and architectural organizations. They are at present working on estimating forms for engineering. It is a kind of educational work that could only be carried on in a National way. Then there is the Symbols Committee on which we have three members, which represent allied electrical trades. We have a Code Committee which works directly with the National Board of Fire Underwriters. That committee has as much to say in the formation of rules and changes in rules as the National Fire Protection Committee has in backing that rule. This Code Committee is of almost inestimable value in preventing rules being passed that are not practical. There are many cases where rules are suggested by some branches of the industry that read alright but looked at from an installation standpoint are impractical, and when the installation difficulties are presented they are not adopted.

Then we have the Cost Data Committee whose work is chiefly to get at the costs of electrical installations. That committee has been working for four years against tremendous handicaps because cost data of installations is not kept with uniformity by contractors. Much has been said lately about neglecting the contractor for the merchandiser. I don't think that is the case. It may appear so from our publications. That, I think, is because it is so much easier to get readable articles on merchandising, than on contracting. Naturally the merchandising of electrical goods is closely related to other types of merchandising. On the construction end, however, we can't get the material. The men who, if you could get them to sit down, could tell you all about it, have not time to do so. We had a valuable report known as the "Labor Data" report presented in Cleveland in 1919, that gives data on special classes of installation. The work of the committee is to educate the contractor members of the organization so that they will keep their data in uniform shape so that we can collect it and build up statistics that will give you the data you want. It is a big piece of work. It is educational and must progress slowly. You will be asked as time goes on to keep

your data in accordance with suggestions of the committee, and while it may not agree with your ideas on the subject, I hope you will do it. We want to be able to call on the whole country for data of a uniform nature, and from that data give you the results you want.

Doing a Valuable Work

The Credit and Accounting Committee work is very closely related to that of the Cost Data Committee. They are doing very valuable work. We found from our experience of cost accounting that we had devised a standard system that was too big for many members and we don't recommend it for business below \$40,000 a year. Our next step, therefore, was to bring out our "Business Record System" adopted at Baltimore. It is very simple. It is a single-entry system that can be balanced. It gives you the fundamental information you want to have in your business. It is sold to members of the association at \$9.75, and \$12.50 to non-members. It is so arranged that you can easily transfer from it to the Standard Cost Accounting System when your business demands it.

That leads me to the important question of the cost of overhead, in which is involved the question of whether there is a proper spread in price from the cost to you and the selling price to the consumer. Between your purchase price and the price at which you are obliged to sell must be a margin sufficient to cover your overhead and give you a reasonable profit. We have got to show the manufacturers and jobbers the actual conditions in our business: what it costs us to handle their goods. We must prove to them that we are not covering up inefficiencies and poor business methods. The only way we can do that is by getting this data from all sections of the country, which is very difficult. A questionnaire goes out once a year on the cost of overhead. It has been gone over very carefully and every question asked is with a definite purpose in view. There is no question that can't be answered very easily if you are handling your business properly.

Make Actual Investigations

Last year we went a little farther in our investigations. We investigated six concerns located in three different cities in the States all doing a business of about \$100,000 a year. We sent auditors to these concerns who went right through their books for an entire year and figured the cost of business and took averages. The report of this effort was published in Bulletin 33, and did more to stir up the question of proper compensation to the dealer than any other document ever put out by the National Association. It clearly set before them that the cost of merchandising in the contracting-merchandising field was 30 per cent. The cost to us to investigate those six concerns was about \$85 apiece. The point I want to emphasize and impress on you is that that's the way we must do this work.

Our figures possibly were open to criticism on the ground that they were biased because they were collected by our organization. To overcome that we are trying to get a joint investigation made by the Harvard Bureau of Business Research, which devotes its time to investigating business conditions in retail trade. We have been made a proposition to carry on a three years' investigation in our business and put the results out in bulletin form. We had put before us in Baltimore, by Mr. Goodwin, a chart dealing with the question of handling retail business. I cannot work it out mathematically for you here, but I know it works. Briefly his proposition was this. To find out the profit on your capital, take your gross profit less your overhead; divide by your merchandising account—the number of days your goods are carried in stock—plus your accounts

receivable and multiply by 100—the number of working days in the year, and you will arrive at the profit on your capital. For example, take a concern with a gross profit of 30 per cent. less your overhead of 25 per cent. divided by your merchandising account, say, 120 days, plus your accounts receivable of say an average of 120 days old: that gives you a profit of 7.5 per cent. on the capital invested. Take the same concern and increase the efficiency, leaving the gross profit the same, the overhead the same, bring the merchandising account down to a turnover of 30 days, accounts receivable averaging 30 days and the profit will be 30 per cent. on capital invested. You have done nothing but increase the efficiency of the concern, but look at the change in profit.

The Data and Sales Book

Now I want about the Data and Sales Book. I don't think the book is appreciated as it should be. That book, properly used, is the most valuable asset the association has. It gives you under one cover most articles of ordinary use in your business, and it gives them in a form that you can use it as a cost book if you wish. At the back of the book we give you engineering data which includes the National Electric Code re-printed exactly. It is my opinion that the contractor can take that book with him on a hurry call and estimate a job right from it. The trouble is it is not appreciated and not used. The merchandising end is taken care of by pink sheets in the front. They give you, on the first two pages, a condensed list of articles you sell over the counter every day. In the appliance end it gives you a pretty complete, comparative list of all the different appliances. We have on three different occasions sent out bulletins explaining how the book can and should be used. It is one of the most expensive undertakings of the association. It cost us six thousand dollars last year. I hope, Mr. Chairman, that this district will take our bulletin No. 27 at an early date and go through that book and see what they can do with it.

The work of the House Wiring Committee is of a very general character. That committee works principally with the National Electric Light Association in getting out plans for securing residence lighting. At present the committee is working on a plan for co-operative campaigns embracing central stations, jobbers and contractors. In the city where this work is being tried out, the central station supplies cards, showing unwired houses on their lines to the contractor at 10 cents a piece. The central station puts up an equal amount, all of which is devoted to advertising. The territory is divided up into districts, so that there is no duplication in effort. The contractor-dealer only needs to buy as many cards as he feels he can successfully handle in his business. If a card is returned to the lighting company signed or bearing a definite reason why the contract was not secured, a new card is given the contractor without charge.

The Publication Committee operates the Contractor-Dealer—a much criticized and much thought of publication. This publication produces one-half of the revenue of the association. We want articles of any sort that are of interest to the trade. It has been claimed that the association should not publish a paper in competition with other trade publications; but I would like to point out that when this paper was started there was no other trade journal in the field to do the pioneer work in this connection. I would not say but that it would be wrong for an association of this kind to start publishing a new paper now, when there are well established and established ones, but that is a different thing altogether.

Then we have the Standardization Committee. At present it is not very active. Its efforts have been somewhat

checked by patent rights, etc. We are keeping at it, however.

A Labor Committee

The Labor Committee represents a movement that has not, I think, been attempted by any other trade. We have a committee of five which meets with a committee of five of the I. B. E. W. Their first act was to adopt a set of principles. The National Labor Council was created to get those principles adopted by all the local unions as the basis of uniform agreements. They also form a Board of Conciliation. That board will function in cases where the local machinery cannot succeed in settling any question.

Then we have the Trade Policy Committee, which forms a sort of clearing house for the association. It is composed of the chairman of the Manufacturers' Committee, the Jobbers' Committee, the Central Stations' Committee and the Merchandising Committee. It deals with the broad policies of the trade.

The Membership Committee acts entirely on the question of getting members. On January 1st we had over 2,200 members in the National Association. That represents 47 states in the U. S., two divisions in Canada and one in Mexico. When you consider that those members represent over a hundred million dollars worth of gross business and over fifty-four million dollars worth of supplies bought, it is a pretty representative organization. We need more members, and we want more members in Canada. Every member adds weight to the association. The work involved in handling this membership is very large. We handle something over 434 forms for the association. Last year we took in a little over \$25,000 in dues from members. That means an average of \$12.96 per member. I may say here that the average dues per member collected in Canada is \$15.76, so Canada is above the average in paying dues. The expenditures for the year were over \$32,000 or \$31.08 per member. This may look like a losing proposition, but the difference is made up from the profits of the Electrical-Contractor-Dealer and the sale of forms to non-members of the association, on which we make a profit. We make no profit, however, on forms sold to members of the association.

It is the Responsibility of the Contractor to Make Wiring Installations More Complete

By Jno. L. Ganz*

These, then, are the functions of the contractor-dealer:

1. To advise the consumer of the possible useful applications of electricity to his factory, his office or his home.
2. To supply him with the machinery, appliances and equipment necessary to make these applications.
3. To furnish him with sufficient and proper outlets and connections to attach this equipment most conveniently and to use it most advantageously.

In the first two of these, the contractor-dealer is aided by the manufacturer; in these two respects he is in effect the manufacturer's agent, and all the manufacturer's and jobber's information, experience and advertising skill are at his command; all he needs is the intelligence to use them, together with his own salesmanship. In the third, however, he stands more distinctly on his own resources and judgment, and in this, because of the further lack of a co-ordinated attack upon the problem by the united organization of contractors, he has been weakest, and this weakness

has been reflected through the whole industry to its continual detriment.

New Branch of Industry

I say this not in criticism of the contractor-dealer, but because the history of the industry, and our daily experience bear it out as a fact. The rise of the electrical contractor to the dignity of one of the main factors in the industry has been comparatively recent. The other branches of the industry were highly perfected and organized before the contractor realized his opportunities and began to seize them effectively. In other words he was late in occupying his field, and for those reasons he has to work harder and advance more rapidly to overcome the handicap of his late entry.

The wiring installation is to the consumer what the central station company's distribution system is to the community as a whole. The electric company's distribution system delivers the current to the consumer's premises; the wiring installation distributes it within his premises to the separate points of utilization. The one is a miniature of the other, and supplementary to it, just as the capillaries branch out from the arteries, and carry the blood to perform its active processes on the individual cells of the body. Economy and efficiency, which include convenience and comfort, demand that the point of interior delivery shall be the point of utilization, and that means the point of most advantageous use.

Point of Interior Delivery

A complete wiring installation, therefore, is one that provides a point of interior delivery for all the points of advantageous use. We might define what for the purpose of standard practice we could call advantageous use, and that definition would probably be a use under conditions that effectively supplies a need or a desire. The conditions, then, under which a need or a desire is to be supplied will determine the point of delivery, and these conditions embrace a number of elements that call for the study, judgment and experience of both the dealer who furnishes the appliance or equipment, and the wiring contractor who furnishes the outlet or point of delivery for the energy to actuate or operate the appliance.

These elements include convenience, safety, economy, suitability or adaptability, matters of taste, and effectiveness, and many others that appear to the contractor upon inspection of the premises, any or all of which may be modified by notions of the consumer himself, who in nearly all cases is in need of counsel and advice to insure that the fulfillment of the need or desire shall give him the maximum degree of satisfaction and efficiency after it is fulfilled.

The problem confronting the contractor, in laying out a complete wiring installation, therefore, is not always easy or simple. To provide a point of delivery to all the points of advantageous use, requires that points be provided to satisfy desires as well as needs. This, it would appear, would require the contractor to be a mind reader. But he knows what is offered to meet the desires of consumers in the way of devices for comfort, luxury, or show, things designed to produce luxurious and artistic effects, such as ornamental lamps and illuminated settings of various kinds, and he also knows necessary equipment, motive, illuminating, thermal, etc., rendered in the modern factory, office, or home, and of the equipment which, while not indispensable heretofore is—because of its great labor-saving value, economy, and convenience—rapidly becoming indispensable. I refer particularly to vacuum cleaners, laundry and cooking appliances, fans, electrical toilet and sickroom appliances, and the numerous conveniences and labor-saving devices now essential in the home.

With this complete knowledge of the things that can

*Before St. Louis Electrical Board of Trade

be supplied from the storerooms of the dealer, he is given a basis of anticipating the needs and desires of any particular consumer, and with this groundwork, by the application of a thorough analysis of the proposed installation, with a proper realization of his responsibility and opportunities, he will acquire a degree of accuracy in the matter of anticipation that will enable him to lay out installations that will completely and in many cases perfectly serve the premises receiving his attention.

In my opinion the keynote to be struck and maintained is thoroughness. First, a thorough knowledge of what is available in electric appliances to save labor, to supply wants and needs and to add to the comfort and joy of living. Second, a thorough study of the possibility of applying any or all of these to the installation in hand to make it complete, modern, safe and gratifying to the consumer. Third, a thorough explanation to the consumer of the advantages of availing himself of these appliances. Fourth, a thorough installation of the wiring, and outlets necessary to properly attach the equipment now desired, or which in the future may be desired or needed.

Study the Question

There is no doubt that many contractor-dealers follow these principles now; that is why they are successful, but there is also no doubt that many do not—that is, not con-

pated in the beginning of the job and made complete at that time.

Make Every Job Complete

Granting all that has been stated, the next great point to be borne in mind is this: No small group of contractor-dealers can bring about a uniform policy of complete installations. To do that calls for co-operation, for unity among the contractor-dealers and for the co-operation of the other members of the industry.

All Elements Benefit

The other elements in the industry whose co-operation is most essential in the achievement of this end are the utilities and the manufacturers. As for these, their co-operation will be spontaneous, because these will both benefit in many ways by the establishment of the policy of complete installations.

The utilities benefit by the greater market or demand created for the electrical energy which they produce, by the promptness with which a new consumer can be supplied with complete service, since with a complete installation, it is not necessary for the power salesman to advise the consumer that such and such changes will be needed in his residence, office or shop before his desires can be met, which suggestions might tend to nettle or exasperate the consumer, or arouse in him a resentment against the contractor for failing to foresee and provide for his needs, or a resentment against the utility, as the nearest object of reproach connected with the industry.

Help the Public

Lastly, there should not be overlooked the desirable co-operation of the public. This lies chiefly in securing accord with your ideas from the customers you serve. The average customer is tractable, provided he is approached with common sense and logic, and is convinced of the sincerity of your ideas and not given a suspicion that an effort is merely being made to get him to make a larger outlay for the selfish end of the contractor. If properly presented, the arguments in favor of a thorough installation are irresistible. Stress should be laid particularly upon the matter of accident prevention. The National Safety Council has demonstrated beyond contradiction, that proper and complete lighting installations prevent many industrial accidents, which in the aggregate effects a tremendous saving both of money and man-power. The same effect in a lesser way is produced in the office and the home. Proper and convenient outlets in the home prevent the destruction or injury of expensive bricabrac due to sweeper or fan connections dangling from lighting fixtures and lamp connections strung over floors and under rugs, dangerous both from the accident standpoint and as fire hazard, to say nothing of the argument of convenience of operation and neat appearance.

With the gospel of complete installation thoroughly learned, with a definite policy as to methods and requirements, with the co-operation of the utilities, the manufacturers, the jobbers and the other elements in the industry, and with a solid and progressive organization devoted to a high standard of excellence in the execution of its work, to the promotion of the highest business ethics between itself and its patronage and to real fraternal ethics between its members, this division of the industry will quickly be brought up to its proper value and it is certain that it will react to the great advantage, not only of yourselves, but to the entire industry.

Have We Any Cause to Talk Depression?

A summary of the electrical needs of more than two hundred and fifty Canadian towns and cities distributed from coast to coast indicates only 7.3 per cent. saturation on the average. These figures are startling in the definiteness with which they point to vast sales opportunities.

Here are the figures:

Houses wired—74.9 per cent.

Degree of saturation of wired homes:

Electric Ranges—3.1%
Elec. Percolators—3.7%
Elec. Vacuum Cleaners—5.0%
Elec. Washing Machines—5.9%
Elec. Dishwashers—.07%
Elec. Water Heaters—1.3%
Elec. Toasters—18.2%
Elec. Air Heaters—4.8%
Sewing Machine Motors—1.2%
Elec. Irons—45.7%
Elec. Ironing Machines—.14%
Elec. Refrigerators—.06%
Elec. Fans—5.4%

sistently and intensively. It is often not because of any defect in the manner in which they do the work which they do perform, but it is in not doing enough of it and in not having a definite policy.

It often happens that the most skilled workman is useless or helpless without intelligent supervision, which is the directing force that makes his skill valuable. So the contractor-dealer, being his own supervisor, should exercise that supervision, and by study, devise his lines of procedure so that his work shall be a finished article. In this respect, the contractor-dealers have been missing many of their opportunities for advancement, greater prosperity and greater prestige.

Complete installations will do away with piecemeal installations and patchwork, and these jobs have been the bane of your profession. Incomplete installations have kept you busy on trivial jobs, till you allow yourselves to become looked upon at patchworkers, constantly going over and patching up installations which should have been antici-

The Stromberg Carlson Company, Montreal, Quebec, Toronto, have been awarded the contract for telephone installation work on 800,000 apparatus lines being installed on Cumberland Street and Avenue Road.

Mr. Whelpton Watching Developments Re Standard Estimating Sheet

During the past few issues the Electrical News has been laying particular stress on the necessity for Estimate Sheets for the contractor, and, from time to time, drawing attention to the fact that many contractors do not use them at all. We are in receipt of a number of letters expressing interest in these discussions, and print a typical one herewith. Men of this type are of inestimable value to the electrical trade, and the work being performed by the committee which has the standard estimate sheet in charge will prove of value to hundreds of such contractors throughout Canada:

Wilkie, Sask.,

Editor Electrical News:

We, like some others we presume, have never used a proper estimating sheet, in fact have had very little estimating to do the last few years, but we nevertheless realize that such a sheet is a good thing, in fact we know we have sometimes lost money for the lack of such a help.

We shall therefore watch with interest anything along this line that you may bring forth.

We are located in a town of less than 1,500 so you will see that there is not much new building going since the war began. We had quite a lot of farm house wiring in 1917 but owing to crop failures and the prohibitive price of all building material, and labor, there has been almost nothing doing for the last few years.

Yours truly,

W. Whelpton.

Mr. Roach Waiting for Copies, Too

Windsor, Feb. 4, 1921.

Editor, Electrical News:—

Regarding Standardized Estimating Sheet for Canadian Electrical Contractors, referred to in your issue of Feb. 1, the writer is quite familiar with the sheets used by the National Dealers' and Contractors' Association, and also the Chicago Estimators' Association.

As we have in the past few years done a very small amount of work on a contract basis, we are not at present using either of the estimating forms. We are, however, desirous of obtaining a supply at an early date. The writer personally prefers a form along the lines followed by the National Dealers' and Contractors' Association. We are quite sure, however, that any form prepared by the very capable gentlemen who have been selected for this purpose, will be satisfactory to us, and we would appreciate your informing us as soon as these sheets are available.

Respectfully,

McNaughton-McKay Electric Co., Limited,

A. E. Roach, Manager.

Canada's Big Fire Loss

According to published report, Canada's fire loss for 1920 was approximately \$4,000,000 higher than in 1919, and is exceeded only by 1918, when the exceptionally high figure of \$31,815,844 was reached. There were 301 fires causing a loss of \$10,000 and over compared with 288 in 1919. The following is a summary for the past three years.

	1918	1919	1920
Average Monthly loss	\$2,651,320	\$1,911,910	\$2,280,964
Loss per capita	\$4.11	\$2.90	\$3.12
Fires with damage of \$10,000 or over	256	288	301

Favor Metric System

The Metric Standards Bill has just been introduced in the U. S. Senate by Hon. J. S. Frelinghuysen of New Jersey, and in the House of Representatives by Hon. Fred A. Britten of Illinois. Provision is made for a gradual advance to the decimal metric units of weights and measures, during a transition period of 10 years. It is important to note that this bill enables the manufacturer to choose the weights and measures for use in production, but calls for the employment of the metric system in commercial transactions.

Five Wireless Stations

A contract for the construction of five wireless stations, two at Shanghai, one at Haankow, one at Peking and one at Harbin, is reported signed by the Federal Wireless Telephone Co. of America and the Chinese Ministry of Communications. The contract is said to have a clause providing for an advance by the company of \$4,500,000 to the Chinese Government.

McDougall, Pease and Friedman

Messrs. Geo. K. McDougall and E. Raymond Pease, electrical engineers, and Mr. Ferdinand J. Friedman, mechanical engineer, have formed a partnership, the new firm being known as "McDougall, Pease, and Friedman," consulting engineers, Drummond Building, 511 St. Catherine St. W., Montreal.

R. M. Eames, General Sales Manager

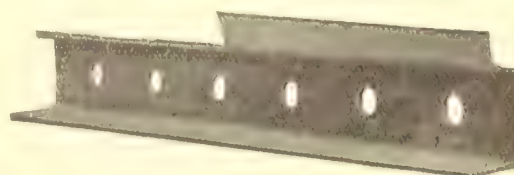
The Bryant Electric Company announces the appointment of Mr. Robert M. Eames as general sales manager to fill the vacancy caused by the resignation of Mr. Frank V. Burton. Mr. Eames has been active in the sales organization of The Bryant Electric Company for fifteen years and for the last few years has been its export manager. He is thoroughly familiar with the sales policy, the complete line and its rapid development.

32-Volt Power Stand

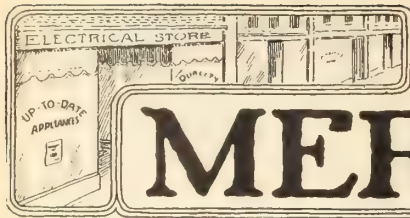
The 32-volt power stand, manufactured by the Westinghouse Electric & Manufacturing Company, is illustrated and described in Folder No. 4448, entitled "Do Your Chores Electrically," just issued. This folder includes a mailing card, which can be imprinted with the name of the dealer. The many uses of this power stand are illustrated in this folder.

Railway Insulation

Bulletin No. 14 has just been issued by the Diamond State Fibre Co. of Canada, Ltd., Toronto, describing and illustrating Diamond Fibre railway insulation for electric railway purposes. The company manufacture a special "Diamond-F Railway Insulation" for railway joints, which



are subjected to excessive pressure and vibration. The bulletin also illustrates the various forms of special Diamond-F track insulation such as standard fish plates, Weber plates, washer angles, bolt bushings, switch shims, ferrules, gaskets, etc.



BETTER MERCHANDISING



Buy Electric Goods in an Electric Store Time is Ripe for Manufacturer, Wholesaler and Dealer to Adopt this Slogan

Many of our readers have noted and remarked upon the statistical article published in the Electrical News of February 1st, in which we pointed out how very far from saturation the electrical merchandising industry still remains. These figures were gathered from a questionnaire sent out to central station men and others who were in close touch with the merchandising situation.

In addition to the questions discussed in our last issue, which dealt chiefly with the extent to which electrical appliances of various kinds have already been placed in our homes, suggestions were asked regarding improvements and betterments in methods of merchandising, so that greater saturation of the field may be produced in the near future. One of the questions we asked was, "If you don't think the merchandising end of the electrical industry is developing as fast as it should, will you state what you consider ought to be done to improve conditions?"

Some of the answers to this query are exceedingly helpful and to the point. Again and again the harmful competition of the hardware store comes in for comment.

J. F. McGregor, of Campbellford, writes:

"Cut out the hardware stores handling electrical supplies and let the electric stores have the business, so that it can carry larger and more varied stock of appliances."

The same sentiment is expressed by H. A. Blakeborough, city engineer of Vernon, B.C., who writes:

"The thing that I consider is doing the greatest harm to the electrical merchandising industry to-day is the handling of these lines by hardware and departmental stores. These people as a rule have very little knowledge of the different appliances and are unable to tell the customer the cost of their operation and, further, are not in a position to recommend the article most suited to the customer's requirements. The result is that very often the customer is sold something that does not meet his needs, costs far more than he expects for operation with, very often, an article of inferior manufacture which just lasts the guarantee out and then goes to pieces. The result is a knocker instead of a booster for 'doing it electrically.'"

W. P. Derham, Arnprior, also has definite views on this subject:

"The manufacturers, wholesalers and distributors should protect bona fide electrical retail shops. It is a crying shame the way wholesalers and distributors sell electrical goods to hardware shops, plumbing shops, tinsmiths and others not in the electrical business—even to consumers—at the same discount given to the bona fide electrical shop. These people then sell these goods as a side line at practically nothing above cost, like a drug store sells postage stamps, simply to attract the public. This results in the public getting the impression that the electrical shops are charging exorbitant prices. Furthermore, the hardware men and others frequently have below-standard goods foisted

on them, whose poor quality eventually does injury to the electrical business as a whole. What is needed is co-operation between representatives of all electrical supply men from the manufacturer down to the retailer."

Here is another on the same topic from one of the largest central stations in Canada, doing probably the biggest retail business.

"We must fit together and co-ordinate all branches of the electrical industry for co-operation to our mutual advantage. Electrical merchandising must be kept in the hands of people whose business it is, keeping out of the merchandising end such as department stores now handling such merchandising, and whose employees are very seldom familiar with appliances, either as to benefits, uses, installation or cost of operation, and whose chief aim in selling appliances seems to be to advertise cut prices."

From the province of Saskatchewan comes the following:—

"I would suggest that the leading wholesale electrical supply jobbers stand back of and support reputable and competent electrical dealers more than they are doing, and cater less to local hardware merchants. All the hardware merchant is concerned about is to make a sale, and he gives very little thought to the service to be received from electrical apparatus he sells. In the majority of cases he cannot give an intelligent reply to his customers when dealing with complaints. If the electrical supply jobbers supported the retail electrical merchants to the same extent in the matter of credits and checking of stocks that the wholesale hardware jobbers are extending this service to local retail hardware merchants, we would have better electrical stores in our western cities than we have at present. The time is now coming when we should have exclusive electrical retail stores, and the sooner it comes the better it will be for all concerned in the electrical industry."

A number of other points not bearing directly on the hardware situation, but of special interest, were brought out by other correspondents. One of them writes:

"I would suggest that stores educate salesmen to know more about what they have to sell, without having a string of talk memorized which they hand out to all customers alike. Such salesmen, when an appliance is sold, should explain how to use it to get the best possible results; they should also see to it that the appliance is turned out with a proper attachment plug that will fit the receptacles in the customer's home."

A western city manager expresses himself as averse to going into competition with the local electrical stores. He says:

"I may say, however, that the sale of domestic electrical appliances has been strongly pushed by local electrical dealers who are averse to such sales being made by a public utility, and personally I believe this to be the best method, provided these dealers can satisfactorily meet the requirements of the public."

An interesting point is raised by another western central station man. He suggests that "electrical companies should combine and employ a demonstrator to travel through the country and demonstrate in the various towns and villages the different uses that can be made of the various

electrical appliances." He suggests also that these trips be made out into the country, but presumably he has in mind only localities served by local central stations or well supplied with private plants.

One of the largest western central stations says:

"More co-operative advertising and propaganda with the object of educating and influencing the public as to the value of the electrical industry as a whole and the service we can render in the community and to the individual both industrially and in the home."

The superintendent of a local town plant in the province of Quebec touches a vital point when he says:

"Urge upon all contractors and architects the importance of having service conduit large enough to take care of electric ranges whether the house is to have a range immediately or not. Eventually they will have one."

A Manitoba town has been having trouble with its lighting plant, but are getting nicely into shape at last. The superintendent writes that "there will be quite a demand for all kinds of appliances, and there is a good opening for the man who knows the electrical retail business." He adds that at the present moment only the hardware stores stock a few of the items, and says: "If you could be the means of introducing this matter to some capable person this in itself would be a great work."

An Alberta correspondent complains that the industry

is removed the better. There may be cases—no doubt there are—where the town is not large enough to support an electric store, and in such a case the office of distribution must be taken by someone else. Beyond this point, however, there seems to be no justification for manufacturers and jobbers giving support to other than electrical stores, because, if there is any certain district which should have an electrical store and for some reason does not have one, then the interests of the industry demand that manufacturers and jobbers amongst them, or individually, should see to it that a store is established.

"Electrical goods as side lines." This is the attitude of the man who is not an electrical merchant. He is indifferent to the merits of his goods, ignorant of their good points and incapable of rendering that service which electrical goods only can render. Let us all—working together—keep that excellent motto in mind that we spoke of in our last issue as exemplifying the attitude of one of our largest manufacturers of electrical goods—"Buy electric goods in an electric store."

Speed Up Your Turnover

Either Increase Sales or Reduce Inventory

—or Both*

The manner in which our large five and ten cent stores handle perishable merchandise illustrates one way of getting profits by turning your capital investment. A two per cent. cash discount is the only profit obtained. When multiplied by fifty-two turnovers the two per cent. cash discount exceeds the original capital investment. Turnover, therefore, is that factor which multiplies profits.

One dealer with \$5,000.00 capital may turn his stock four times annually. Another dealer with \$10,000 may turn over his stock only twice in the same period. Yet both dealers earn the same amount of profits during the year.

In the first case \$5,000 made just as much money for the owner as \$10,000 did in the second case. By turning his stock more rapidly the first dealer accomplished the same results as his competitor who invested twice the amount.

With each turnover a profit is made. This adds surplus to the business. Capital goods are increased. As a result each successive turnover means a turnover not of capital alone; but also of surplus. The more rapid the turnover the greater the surplus and thus more profit is made on the surplus itself.

Some large corporations sell their products on three per cent. profit. Yet these same companies declare eight per cent. dividends. This results from the extra profits that accrue from turning over their surplus.

The principle of turnover can be reduced to a simple equation. This may be stated as follows:

$$\text{Number of turnovers} = \frac{\text{Total yearly sales}}{\text{Average stock during year}}$$

Take as an example a dealer who maintains an average stock of \$5,000. If his total annual sales amount to \$25,000, then

$$\frac{\$25,000}{\$5,000} = 5 \text{ turnovers}$$

From this it is evident that turnover may be increased in three ways.

(1) By increasing gross sales: For example, suppose the dealer increases his gross yearly sales from \$25,000 to

*By J. A. Clark in "Contract."

Buy
Electric
Goods
at an
Electric
Store

Can you suggest a better slogan for the whole electrical industry?

is handicapped because manufacturers fix the prices of appliances, which eliminates competition.

Another western optimist sends in the cheery news that they have not yet nearly reached the saturation point and want still more publicity.

A number of letters speak of the financial requirements of carrying a sufficient stock of appliances as being beyond their means. A typical letter runs as follows:

"We should have consignment stocks on at least three months' time on larger appliances so that we could afford to stock a greater variety. This would give us time to display the merchandise and get it sold. Under present conditions we have to tie up capital on washers, ranges, cleaners, etc., which move slowly, as it takes about a month to get delivery, a month to sell, and another to collect when introducing new lines to our customers."

From another direction comes the admonition "advertise more, dress your store windows better, and handle nothing but first-class merchandise."

It is evident from these letters that electrical dealers are now making a definite and careful study of the conditions surrounding their business. Of all the questions discussed, however, and of all the opinions expressed none gets so much attention as the "hardware store." The electrical man has plainly made up his mind that the hardware store is a menace to the industry and that the sooner this menace

\$50,000. At the same time he maintains the same average inventory of \$5,000.

\$50,000

———— = 10 turnovers.

\$ 5,000

The number of turnovers will be increased from 5 to 10.

(2) By reducing the average inventory: If the dealer succeeds in making the same amount of sales and reducing his average stock from \$5,000 to \$2,500, then his number of turnovers will be increased from 5 to 10 as before.

\$25,000

———— = 10 turnovers.

\$ 2,500

(3) By increasing sales and reducing the average inventory: By combining (1) and (2), two forces are made to contribute to the increase of the turnover ratio.

For example, suppose the dealer in the above case increased his sales from \$25,000 to \$40,000 and at the same time reduces his average stock to \$4,000 in turnover will be increased from 5 to 10 as before.

\$40,000

———— = 10 turnovers.

\$ 4,000

Some dealers resort to price cutting in order to increase sales. They regard this as the most effective means to quicken turnover. Bargain sales may increase the number of turnovers. But this practice is rather dangerous.

On the other hand, well meaning dealers maintain prices as a matter of principle. Yet some of these same dealers complain because they seem unable to increase their turnover. In both cases the dealers in question should recognize that intensive selling methods are their only solutions. Prices can be maintained, but carefully designed and actively prosecuted sales plans must be employed to promote increased sales and quicken the turnover.

Advertising must be stimulated. Either improved selling methods or greater investment should be considered. Additional salesmen may be put on. Perhaps, the dealer's methods of displaying merchandise is at fault, or the dealer's store may be on a side street. A new location may be necessary. All of these additions and improvements will increase sales but they will also increase the cost of doing business; the additional profit resulting from increased turnover must outweigh the increased cost of doing business.

Intensive Selling Methods

Suppose a dealer's gross sales amount to \$50,000 annually and his selling expense approximates \$10,000 for the same period. His cost of doing business is 20 per cent. of gross sales. Now suppose the next year his sales are increased to \$75,000 while the cost increased to \$13,500. In this case, the cost of doing business has dropped to 18 per cent.

In many cases the per cent. cost of doing business will remain about constant as the volume of the sales increases. This condition will continue to increase the dealer's net profits. For, he will be figuring the same per cent. profit on a larger volume of gross sales.

Many dealers buy enough stock to last them six months business every month. This enables them to keep an accurate accounting. The dealer can then keep in close touch with each fluctuation in his business. Losses and leaks can be checked. Profits can be stimulated.

Many enterprising dealers maintain a perpetual inventory. On the stock card maximum and minimum stock figures are indicated. When the stock is diminished to a predetermined figure an order is given for replacement.

A reasonable time is allowed the manufacturer and the jobber for shipment. Delays in transportation are also reckoned with. With these facts in mind, the dealer can

arrange his orders so that new merchandise will be coming in to replace his reduced stock.

Make Wise Reductions

Many dealers buy enough stock to last them six months or longer. Aside from the speculative feature of such buying, this practice would not ordinarily be recommended. Dealers who have been accustomed to carrying large stocks will greatly increase their turnover by making wise reductions.

Some successful dealers figure their stock by budget. The volume of sales in each line is estimated. This is not difficult. Figures from past sales are usually available. Jobbers' and manufacturers' representatives can also assist in approximating future developments. The dealers' available capital is then pro-rated. Each line is stocked accordingly. In this way the dealer can distribute his capital in the most economical manner. At the same time, great care is given in stocking each line so that the benefit of turnover may be realized.

In the previous examples the figures were reckoned on an annual basis. This, however, is not done in the electrical business.

In the summer a large stock of fans could be carried on hand. These may be turned over several times during the fan season. A decreased stock is carried during the

Inspectors Can Help

It would work no hardship to the electrical industry, or anybody else, if, during the next few months the various inspection departments should use extra pressure to have undesirable conditions remedied. Just at the moment many electrical contractors could take care of more business, and if factories and other buildings could be overhauled during the lull it would put everybody on a firmer foundation for the rush of business when it comes a little later.

rest of the year. In such instances, however, the "fan season" may be regarded as the period during which the turnover is figured. The formula explained before could then be applied until the turnover calculated of the stock figured accordingly.

Irons, heaters, percolators, etc. may be carried in large quantities during July and December. Seasonal stocks may be stocked in large quantities in the spring and fall: washing machines in the spring and summer, etc. By taking advantage of the seasons and intensifying advertising and selling efforts, sales may be greatly increased. At the same time the inventory should be figured to increase or decrease as demand for these appliances soars and falls.

Total sales and advertising these are the two measuring features which measure the degree of success of any dealer's business. Their value individually and their relation to each other determine the dealer's turnover—and consequently his profits. Profits figured not as a per cent. of each sale, but total annual profits figured as a per cent. of capital investment—this should be the guiding principle upon which every dealer should base his profit sheet.

The death is reported at Montreal of Mr. A. B. Smith, former superintendent of construction of the Great North-western Telegraph Company and from 1903 to 1913 manager of telegraphs of the Grand Trunk Railway System in his 72nd year.

"Do it Electrically" Needs a Running Mate

During the past few years the electrical industry as a whole has benefitted greatly by the almost universal adoption of the slogan "Do It Electrically." While this slogan can scarcely be said to have finished its work yet, it does appear that the retail end of the industry is in need of something a little more specific, and we suggest that it be supplemented in future by the slogan "Buy Electric Goods in an Electric Store."

To this end we would urge that attractive window display cards bearing these words be distributed widely by electrical manufacturers and jobbers and prominently displayed by electric retail stores.

One of our readers pointed out recently that there is no more reason why people should buy electric goods in hardware stores than that they should buy hardware in a grocery store. The handling of electric goods by hardware stores, which has been resorted to in the past to a considerable extent, is merely a transition stage. Where there have been no electric stores, or where the electrical stores have not been taking proper advantage of their opportunities the manufacturer perhaps has been justified in using the best means at his disposal for placing his goods before the public, but no one argues that anyone else can sell electrical goods,

**Buy
Electric
Goods
at an
Electric
Store**

The public will receive the news gladly.

and the service that goes with them, as satisfactorily or efficiently as can the bona fide electrical dealer. To begin with he is an electrical dealer because he likes the business and is in sympathy with electrical goods. Second, he understands the construction and the merits of his goods. Third, he knows how to repair them, how to advise his client in their use, etc. All these things should be brought to the attention of the public. The public realizes that there are many things to be explained about electrical equipment, and they are as anxious as can be to go to the store where the explanations will be clearest and most complete. As a matter of fact the ordinary woman does not visit the hardware store at all with any relish, as she is not interested in monkey wrenches, axes, rope, or wire.

We suggest, then, that the time is ripe for an active campaign along the line of the slogan "Buy Electric Goods in an Electric Store." The public will receive the news gladly. It will mean a bigger volume of business to the dealer, and consequently a bigger profit. The first step seems to be the wide distribution of window cards, and the adoption of this slogan in all forms of advertising.

Mr. George W. Lee, recently appointed chairman of the T. & N. O. Railway Commission, is quoted as saying that the electrification of that road will be given serious consideration in the near future. On account of the long coal haul steam operation has proved very expensive.

Electrical Appliance Company Opens Under New Management at Portage and Notre-Dame, Winnipeg

The Electric Appliance Co., corner of Portage Ave. and Notre Dame Ave., Winnipeg, was taken over by C. R. Wheaton, of Saskatoon, and George R. Miles, of Winnipeg, on the 1st of February. The management is in the hands of Mr. Miles, who has had a long and varied experience in the electrical business. The new firm intend to continue the business under the same name, and plan to build up a similarly balanced business as the Saskatoon house, entering strongly into the contracting field, and at the same time building up the retail selling of all appliances and fixtures. Structural alterations are now being planned to give increased space and storage; also additional premises are to be leased and a workshop installed.

Mr. Cecil R. Wheaton was born at Peterboro, Ont., where he commenced his electrical training with the Canadian General Electric Co. In 1909 he went west and settled in Saskatoon, and three years later started in the wiring business with his brother Albert. The business rapidly grew and a store was opened on 20th Street. This was replaced in September, 1919, by the present store on 2nd Ave., but had to be added to last fall by a 70-foot addition in the rear as a workshop, where a staff of three armature winders is continually employed, in addition to repair men, and those engaged in the building of switchboards. Mr. Wheaton has



Mr. Cecil R. Wheaton

an outside staff of 15 men on contract work which includes the new building for Saskatchewan University, the new Normal School and the Mayfair School. The many friends and business associates of Mr. Wheaton are pleased to welcome him home again, after his having spent three months in a Chicago hospital.

Mr. George E. Miles was born at Windsor, Ont., and started his electrical career with the Otis Elevator Co. in 1904, his next move being to the C. P. R. as armature winder, and on construction work, and as draughtsman in the engineering department at Fort William, Brandon, and Calgary shops. From the C. P. R. he removed to Minneapolis, taking the position of foreman wireman with the Pierson-Wilcox Co. Mr. Miles then received an offer to take charge of the erection department, Canadian Westinghouse Co. in the city of Winnipeg, and was later promoted to assistant



Winnipeg Electrical Appliance Co.'s store opened on February 1st

engineer, Winnipeg district. On August 25th, 1915, he enlisted with the 1st C. M. R.'s, attaining the rank of captain, and eventually was appointed officer-in-charge district 4 workshops. On demobilization he re-entered the service of the Canadian Westinghouse Co. as sales engineer for the pro-



Mr. Geo. E. Miles

vince of Saskatchewan. It was during this period that he became acquainted with Mr. Wheaton, which has resulted in the forming of a partnership, and buying out the Electric Appliance Co., Winnipeg.

Mr. A. S. Byrd, Montreal Tramways Company, is recovering from a severe attack of bronchitis and pneumonia.

Manitoba Electric Association Endorses "Father and Son" Movement

Linking up with every public-spirited movement that is launched in Winnipeg, the members of the Manitoba Electrical Association endorsed the "Father and Son" movement at their fortnightly meeting held in Winnipeg, February 3rd. The members were addressed by W. H. Moor, of the Y.M.C.A., on the movement, and evinced a great interest in what was said. Mr. Moor pointed out various ways in which to make the movement a success; he said that for fathers to maintain a closer connection with their sons and chum with them, would tend toward better citizenship in the future. The association thanked Mr. Moor for his able talk and ensured him that they would "spread the gospel" and give every assistance necessary.

Equipping Hudson Bay Stores

Contracts have been awarded for the electrical equipment for the Hudson Bay Co.'s stores at Victoria and Vancouver, B.C. The equipment for the Victoria store will comprise two motor generator sets, each consisting of a 3 wire, 114/228 volt, 300 kw., d.c. generator and a 3 phase 2200 volt—435 kv.a., 60 cycle r.p.m. synchronous motor; also a twelve panel switchboard for controlling same. The contract also covers 2 sets of storage batteries and low tension motor generator set for charging. The contract covers the installation of this equipment in the Hudson Bay Co.'s new store at Victoria. The equipment for the Vancouver store will comprise one motor generator set consisting of a 3 wire, 114-228 volt, 350 kw., d.c. generator and a 3 phase, 2200 volt, 400 kv.a., 60 cycle, 900 r.p.m. synchronous motor; also a 2 panel switchboard for controlling same. This equipment is an extension to the present installation in the Hudson Bay Co.'s Vancouver store. The equipment for both stores is being supplied and installed by the Canadian General Electric Company.

Vancouver Electrical Men Get Together to Hear More About "Overhead," "Turnover" and "Competition"

Better merchandising, true co-operation, and an awakening to the meaning of the terms "Overhead," "Turnover" and "Competition," were advocated in stirring addresses delivered at a dinner held under the joint auspices of the British Columbia Electrical Co-operative Association and the Vancouver Electrical Contractor-Dealers' Association, in David Spencer's Dining Hall, Vancouver, on January 31. For more than three hours the speakers, Mr. Laurence Davis, special representative of the National Association of Electrical Contractors and Dealers, and Mr. A. C. McMicken, vice-chairman of the North Western Electrical Service League, held their hearers' close attention. More than one hundred members of the two associations were in attendance at the dinner, which was one of the most successful affairs of its kind ever held in Vancouver. Vocal and instrumental solos provided by Mr. Pacey and Mr. Hughes, livened the evening.

Mr. McMicken emphasized the necessity for better merchandising methods in order to cope with the great expected electrical development of the near future and dwelt on the need for a truer form of co-operation between the various elements of the electrical industry, convincing his hearers that unless each unit of the industry functioned as it should, the industry as a whole would suffer. He said, "Merchandising has ceased to be merely an exchange of goods for money. When you decide on your store location, after careful study of traffic currents day and night, you are merchandising. When you select your stock not only with a view to the public's present demands but with the added purpose of awakening the consciousness of future needs, you are merchandising. When you arrange your store so that every product shall make its own strong, silent appeal, and when you train your salesmen to supplement this with the right and timely personal touch, you are merchandising. When you realize that your display windows are the most profitable part of your store, when you study the advice of window experts and put it in practice; when you make every item of the trim a factor in one concentrated visual appeal, you are merchandising. When your advertising is a regular and prominent feature in your local press, tying it with your window trim, and with national advertising; when it anticipates readers' needs and points them to your store; when all these factors keep step with the seasonable requirements, you are merchandising—and not before."

Mr. Davis opened his talk with the direct accusation that the contractor-dealer has "fallen down" in the past. He said that this was caused by the futile effort to side-track competition and the practice of taking jobs at a loss instead of a profit. This condition he declared to be due to the lack of real, practical business knowledge on the part of many contractors and dealers and urged all to combine in an effort to educate every one to the use of a standard accounting system and method of estimating.

With the aid of a blackboard, Mr. Davis illustrated the correct manner to figure such important items as overhead and turnover, and clearly demonstrated the great mistakes many contractor-dealers have made. He explained to his audience the work that is being done by the National Association and taking as the test of the value of association work, "How it works out during a financial and industrial depression," quoted conditions as they exist in such cities as Detroit, where, he declared, the existence of a real, live co-operative association, through its educational

work had enabled the electrical contractor-dealers of that city to ride hard times and point with pride to their books showing business as usual.

Mr. Davis touched on the subjects of cost accounting, estimating and the necessity of keeping a simple sort of single entry system in order that the proprietor might see at any or all times just how his business stood. One statement made by Mr. Davis shocked his hearers to attention; it was, "A department store or a hardware store or any similar place of business has just as much right to retail electrical appliances as the electrical appliance store." This, however, he amplified and explained that it was based purely on a matter of service to the public and that as long as the contractor-dealer could not give equally as good service as the department or other store, the latter had an equal right; however, when the time comes that the contractor-dealer improves his merchandising and in that respect places that part of his service on a par with the other stores, the latter will have to go, as the contractor-dealer is the natural retailer of electrical goods owing to his intimate technical knowledge.

Prominent Electrical Dealer Commends Can. Gen. Electric's Attitude

Guelph, Ont., January 31, 1921.

Editor, Electrical News:—

It is only to be hoped that the Electrical Trade will appreciate the attitude of the Canadian General Electric Company or any other concern who will stand behind "Electric Stores for Electrical Goods."

In the past this has not been done. The very fact that electrical goods have gone into hardware stores, has made it harder for the electrical dealer to sell his appliances such as washing machines, etc. They are unable to give the service, and we know of one particular case in our city where a washer was sold and it was ten days before the customer was able to have the use of it, because they did not know the difference between a 25 and 60 cycle current.

As you say, the sooner manufacturers and wholesalers are prepared to take a definite stand in support of the electrical dealers and give the assistance and encouragement towards the establishment of a retail electric store, the quicker the results will be attained. We heartily agree with you that the hardware stores have no business dabbling in the electrical business, no more right than the electrical business has to sell dry goods.

We also appreciate the article on **The Dignity in Electrical Merchandising Lies in "Better Service"** in your February 1st issue.

Our store is far from what we would like to have it, though we are endeavoring to follow the very thing which you speak about and, believe us, we have every faith in electrical merchandising and we know it is going to be one of the best businesses under the sun. The possibilities are wonderful and it is a work that no one need be ashamed of. If we can be of any service to our fellow electrical dealers, they are free to call on us at any time to exchange ideas on Better Methods of Merchandising.

Yours for Better Merchandising.

Geo. E. B. Grinyer.

The Acme Electric Company, Regd., Room 6, 275 Craig Street West, Montreal, have opened an office under the management of Mr. T. N. Rolling, who previous to the war was on the staff of the Canadian Comstock Company. Since his demobilization, Mr. Rolling has been connected with the Soldiers' Civil Re-establishment Department. He is now engaged in electrical contracting and repair work.

Toronto Electrical Contractors Appoint Mr. E. A. Drury Chairman

At the regular February meeting of the Ontario Electrical Contractors' and Dealers' Association, Toronto branch, the report of a meeting of the Executive Committee, held on January 19th, 1921 was read and approved. The report stated that Mr. E. A. Drury had been appointed chairman of the Toronto branch for 1921, which announcement was received with great favor by the members. The report further explained that the new executive had decided to appoint three major committees, with one member of the executive committee as chairman of each, with authority to sub-divide the work of each committee and to appoint members of sub-committees. Mr. Cross has been delegated to take charge of the Attendance and Arrangement Committee, Mr. Roxborough of the Contracting Committee, and Mr. Drury of the Merchandising Committee. The new president made a strong plea for the assistance of the members of the association in carrying on the work for the coming year. He urged that when they had ideas they pass them along to the committee with suggestions as to how these ideas should be worked out.

The association is to be congratulated on the appointment of a chairman with so much energy and ability as Mr. Drury. If the year 1921 does not show very great progress it will not be the president's fault.

Hamilton Firm Profits By Practising "Better Merchandising"

In the highly concentrated efforts put forth in the direction of "bettering merchandising" of electrical goods, the less conspicuous but very necessary function of repairing of electrical appliances is frequently lost sight of. It is often the case that when a dealer sells an electrical appliance, his interest in that particular appliance ceases with the sale of it to the customer. We believe, however, that a sale is not complete until the customer is satisfied, and that can only be when the customer has used the appliance for a considerable length of time to his or her entire satisfaction. Electrical appliances, like any other household utility, are subject to breakdown, consequently a speedy and efficient repair service in connection with an electric store is a valuable trade-builder to the electrical dealer. It is hu-

man nature always to remember anyone who befriends or assists one in trouble, and the electrical contractor-dealer might as well be that "friend of the needy" as the hardware man, the plumber or some other hyphenated electrical dealer, who is liable to "fix" things so that the last state of the customer is worse than the first.

Just at the moment there comes to our attention a neat business card, bearing the name of H. W. Jutton, 31 Mary Street, Hamilton, Ontario, announcing in bold type the opening of an electric repair shop for household appliances of all kinds, "service guaranteed: prices reasonable." Among other pithy things, the card says: "You probably have an electric device that has been put to one side, which, repaired, would give you the service it did when you first got it. Send it to us, or we will call and get it." This is a splendid example of the power of suggestion in advertising, and the hint that the damaged appliance be sent in or that it will be called for leaves the customer without a reasonable excuse for delaying the needed repairs. Furthermore, in case some may not know just where Mary Street is, Mr. Jutton has placed in large type in one corner of the card the words "Opposite Lyric Theatre," followed by his telephone number. Everything has been done for the customer, and there is nothing left but for her to make up her mind. This is the kind of retail advertising that pays dividends and builds business.

Eugene F. Phillips Extending

The Eugene F. Phillips Electrical Works, Limited, of Montreal, are planning the immediate construction of a copper rod rolling mill having a capacity of 100 tons per day. Provision has been made for future extension to allow of the rolling of copper sheets and drawing copper tubes, as well as the erection of a small refinery to take care of the copper scrap from the mill, together with the scrap from their wire and cable plant. The location of these buildings has not yet been decided.

The present plant is very busy, working night and day, owing to the large demand from foreign countries. The directors are very optimistic with regard to the near future, and while the company have to import their electrolytic copper wire bars just now, they hope that in the course of a few years these wire bars will be produced in Canada in sufficient quantities to make the electrical industry in this country self-supporting as far as copper is concerned.

The ELECTRIC REPAIR SHOP FOR HOUSEHOLD APPLIANCES

**Electric Irons, Toasters, Hot Plates, Vacuum Cleaners,
Cords, Heaters and all Electric Devices used around the
home repaired.**

You probably have an Electric Device that has been put to one side which, if repaired, would give you the service it did when you first got it. Send it to us, or we will call and get it.

Service Guaranteed.

Bells, Table Lamps Repaired.

Prices Reasonable

Phone Regent

31 MARY STREET,

Opp. Lyric Theatre

Mr. Jutton sends out
"snappy" announcements
telling his
clients what he can
do for them—and
then does it.

Current News and Notes

Brantford, Ont.

The BlueBird Corporation, Ltd., of Brantford, which for some time past has been operating on short time with reduced staff, are reported to have returned to full staff, full time basis with normal conditions prevailing.

Cap de La Madeleine, Que.

Mr. J. B. Badeaux, 471 Maurice Street, Three Rivers, Que., has been awarded the contract for electrical work on \$10,000 store and apartments being erected on Alice Street, Cap de la Madeleine, by Francois Marchant.

Galt, Ont.

Messrs. Scott & Bennett, Galt, have been awarded the contract for electrical work on \$25,000 plant being erected for Messrs. Elliott & Whitehall.

Granby, Que.

The Bank of Montreal are erecting a branch at Main and Dufferin Streets, Granby, Que. Contract for electrical work will be let very shortly. The architect is Mr. K. G. Rea, 285 Beaver Hall Hill, Montreal.

Halifax, N.S.

It is announced that the issue of \$500,000 seven per cent. refunding mortgage gold bonds of the Maritime Telegraph and Telephone Company, Ltd., which were recently offered privately, have all been disposed of before a public offering could be made. The price of the sale was 97½ and accrued interest, which gave a yield of about 7¼. These were long term bonds, being dated Dec. 1, 1920, and maturing Dec. 1, 1945.

Hamilton, Ont.

The Canadian Libbey-Owens Sheet Glass Co., Ltd., 241 Spadina Avenue, Toronto, want prices at once on the following equipment: 2 machine motors, 2 turbo-generators, 2 centrifugal compressors, 3 turbo blast fans, 1 electric crane, box shop machines, machine shop tools, conveyors, etc. For further details communicate with the De Vore Engineering Co., Nicholas Bldg., Toledo, Ohio.

The Ontario Gazette announces the incorporation of the Globe Code-Standard Electric Co., Ltd., with head office at Hamilton, Ont., for the purpose of manufacturing and dealing in electric switches, switch boxes, cabinets, panel boards, conduit outlet boxes, electric heaters, electric ranges, etc. The company is capitalized at \$40,000.

Kitchener, Ont.

The Lyons Electric Company, Brantford, has been awarded the contract for electrical work on \$150,000 theatre being erected in Kitchener for the Independent Theatres of Ontario, Ltd.

The Waterloo and Wellington Railway, operating the street railway service between Kitchener and Bridgeport, is reported to have curtailed its service as a result of the refusal of the Railway Board to sanction a 10-cent fare. Two cars a day, each way, will replace the former hourly service. A petition is being circulated in Bridgeport asking that the company be allowed to collect a 10-cent fare. If this permission can be obtained through an amendment to the present legislation the usual service will be resumed.

London, Ont.

The London and Port Stanley Railway are planning to re-ballast the railway from London to Port Stanley, and are also considering the purchase of a new electric locomotive.

Milton, Ont.

The electrical installation in the new high school has just been completed at a cost of approximately \$1,500. In the near future it is expected that extensions to the electrical installation in one of the large brick yards will be made. This extension has been delayed owing to shortage of current. Several prosperous farmers in the vicinity of Milton have installed lighting plants during 1920.

Montreal, Que.

At the weekly luncheon of the Montreal Electrical Club on February 2, Mr. J. R. Brown gave a talk on the "Advantages of the Single Tax," referring particularly to land values. Mr. W. H. Winter acted as chairman. Among the guests were Mr. W. S. Chofield, of London, Eng.; Messrs. E. F. and H. W. Brown, of Milwaukee; Messrs. Stephen Amato and P. A. Hinds, of Toronto, and Mr. M. E. Deering of Winnipeg. A cheque of \$100 was presented to Mr. John Monro, one of the winners of the Ever-Ready contest, by Mr. R. M. Oxley, of the Canadian National Carbon Company.

It is understood that the Abitibi Power and Paper Company are planning to double their present output of newsprint, and largely increase the production of their other products. By May 1st new machinery will be installed which it is expected will increase the output of newsprint to about 500 tons a day, and the production of sulphite, groundwood and boards will be increased to between 200 and 240 tons per day. This will give the company a total production of about 700 tons a day. Hydraulic power development of the company is also being considerably increased, and by May 1st the power development will amount to 50,000 horsepower.

Messrs. J. A. Anderson & Co., 205 Mansfield Street, Montreal, have been awarded the contract for electrical work on the Service Tobacco Shop, Craig and St. Peter Streets, Montreal.

Prices are asked on an annunciator system for apartment house being erected on Regent Avenue, Montreal, by the Denis Construction Company, 180 St. James Street, Montreal.

Messrs. Vincent & Say Electric Company, 351 Union Avenue, Montreal, have been awarded the contract for electrical work on \$70,000 alterations to warehouse on St. Paul St. West, owned by the Seminaire St. Sulpice.

A meeting of some twenty wireless amateurs in the Westmount High School was held recently, when the formation of the Westmount High School Radio Club took place. A constitution was adopted and the following officers were elected: R. E. Howe, B.A., hon. pres.; Samuel Weitzer, president; Donald Sharpe, vice-president; Edward Plow, secretary-treasurer. It was resolved to hold two meetings every week, one being devoted to code practice, and the other to lectures and to "listening-in." An up-to-date radio receiving and transmitting outfit is being installed.

Ottawa, Ont.

A radio club was recently organized in Ottawa, known as the Ottawa Amateur Radio Association. The members will meet on the first and third Tuesday of every month. The object of the association will be not only to give information on receiving and sending wireless messages, but also

to study the scientific side. Major W. A. Steele was elected honorary president; Mr. G. J. Gilbert, president, and Mr. A. R. Gladden, secretary-treasurer.

For the first time a telephone conversation took place recently between Ottawa and Vancouver. The call was routed from Ottawa via New York, Chicago, Denver, Salt Lake City, San Francisco and Seattle. The voices, it is reported, were distinctly heard at each end, and no part of the conversation had to be repeated. The call cost \$16.25 for three minutes.

Penticton, B.C.

Messrs. Etter & Pearson, contractors, Penticton, B.C., will shortly let contract for electrical work on \$25,000 sash and door factory to be built at Penticton.

Regina, Sask.

The gross revenue received by the Regina municipal street railway from passengers carried last year was \$326,480.70 as against \$300,959.50 in 1919, according to a statement recently made public. At the recent municipal election a by-law in favor of the adoption of the one-man street car was carried, and it is expected that the system will be put into effect during the coming spring.

Sarnia, Ont.

Messrs. W. A. Brown & Sons, 218 Front Street, Sarnia, will be in the market shortly for three electrical generators and three motors for their \$50,000 ice-house which they have under construction at Sarnia.

Sherbrooke, Que.

Mr. A. D. Davis, 12 Casino Building, Sherbrooke is in the market for prices on an electric sign for moving picture theatre.

The Quebec Utilities Commission has granted the application of the Sherbrooke Street Railway for increased fares. Beginning February 1st the new rates were: adults, cash fare ten cents. Ticket fare six for fifty cents. Children cash fare four cents. Ticket fare eight for twenty-five cents. After midnight the fare is fifteen cents cash. Transfer privilege without extra charge.

St. Andrews, N.B.

The application of the St. Andrew's Light and Power Company to issue stock to the amount of \$9,900 has been granted by the Public Utility Commission of New Brunswick. The money will be used to supply plant and equipment in connection with their plans to supply electric light and power to the town of St. Andrews.

St. John, N.B.

The new scale of fares on the St. John Street Railway are a ten cents cash fare, three tickets for a quarter, or fourteen tickets for a dollar, with the usual transfers. The company has undertaken to increase the service. They report a decrease of traffic during recent months as a result of general depression. They claim, however, that the increase in fares has not so far had any noticeable effect upon the number of passengers using their lines.

Stoughton, Sask.

The Town Council of Stoughton is making preparations for the construction this year of an electric light plant, which is reported as very badly needed in the town.

Three Rivers, Sask.

Mr. J. B. Badeaux, 471 St. Maurice St., Three Rivers, has been awarded the contract for electrical work on \$20,000 extension to the hotel owned by Beblois Chateau.

Toronto, Ont.

The Canada Electric Company, 175 King Street East, has been awarded, by the Board of Education, the contract

for electrical work on the Grace Street and King Edward schools.

The Hydro-electric Power Commission of Ontario has authorized the following increased rates per horsepower for municipalities receiving power from the High Falls development: Perth, \$41.80; Smith's Falls, \$38.22; Carleton Place, \$44.95. An increase in retail rates of one-half cent per kilowatt hour has also been authorized.

Contracts for electrical work on 24 pairs of houses and one \$18,000 residence on Hillcrest Drive have been awarded to the K-C Electric Company, 1292 Danforth Avenue, Toronto.

Messrs. A. J. Morrison & Co., 269 Albany Avenue, Toronto, have been awarded the contract for electrical work on apartment house being erected at Cumberland Street and Avenue Road.

Contract will be let for electrical work on two stores and apartments being built at 896-898 St. Clair West. The building will be of brick construction, 26 x 60, with two storeys and basement. The owner and builder is Mr. James Phinnemore, 367 Dupont St.

Mr. B. C. Taylor, 25 Marchmont Road, Toronto, has been awarded the contract for electrical work on \$15,000 residence being erected at 1413 Dufferin Street, Toronto.

Messrs. Taylor Bros., 25½ Norwood Avenue, Toronto, have been awarded the contract for electrical work on \$18,000 residence being erected at Brackendale Heights for Dr. W. J. Wilson.

The Toronto Electric Co., 101 Duke Street, have been awarded, by the Board of Education, the contract for electrical work on the Rosedale and Church Streets schools.

Turtleford, Sask.

Messrs. Romeaux & Romeaux, Main Street, Turtleford, Sask., are in the market for prices on electrical equipment for lighting plant to be installed at Turtleford

Vancouver, B.C.

The Jarvis Electric Co., Ltd., 570 Richards Street, Vancouver, has been awarded the contract for electrical work on alterations to Labor Temple in Technical School, which is estimated at approximately \$4,000.

Contract will be let for electrical work on \$50,000 apartment house to be built on Hastings Street East, Vancouver. The architect is Mr. Edwardes Sproat, 403 Dominion Building, Vancouver.

The Vancouver Board of Trade has completed plans for the installation of what is believed will be the most powerful wireless receiving set on the Pacific Coast. The instruments to be installed will be capable of receiving messages from Carnarvon, Wales; the station at Lyons, France; from Nauen, Germany, and from such stations across the Pacific as Cavits, Philippine Islands, and Funahshi, Japan.

Westmount, Que.

The owner of \$25,000 residence being built on Westmount Avenue will be in the market shortly for electric lighting fixtures. Architect, P. J. Turner, 241 Beaver Hall Hill, Montreal.

Windsor, Ont.

The Ontario Gazette announces the formation of the Fournier Manufacturing Company, Ltd., with head office at Windsor, for the purpose of carrying on manufacturing of all kinds of electro-plating. The company is capitalized at \$50,000.

Woodstock, Ont.

Messrs. Davidson & McInnes, Thomas Street, Woodstock, have been awarded the contract for electric wiring and lighting of the Woodstock Police Court.

"PITTSBURGH"



The Scientific Show Window Reflector

Illustration shows "Pittsburgh" Reflector No. 100, for 100 or 150 Watt Lamp. Dimensions: Height 8 inches, width 8 3/4 inches, holder 2 1/4 in. Form "0."

It reflects and controls the light to give the greatest possible illumination to the object. The "Pittsburgh" Reflectors, by scientific construction and test

give the maximum result from your lighting, and will pay for their small cost in saving of current. Don't fail to write for our folder on lighting efficiency.

Pittsburgh Reflector and Illuminating Co.

PITTSBURGH, PA.

Canadian Distributors

JAMES DEVONSHIRE, LTD.

701 Yonge Street,

Toronto

Tenders Wanted

should be advertised for in the "Tenders and For Sale Department" of the **CONTRACT RECORD AND ENGINEERING REVIEW**. This paper is the "Tender Ad." medium of Canada and always brings bids from the reliable contractors and supply houses. File your plans for any work on which you are inviting bids in our offices at Toronto, Montreal, Winnipeg or Vancouver.

Contract Record

and Engineering Review

TORONTO

ONTARIO

A. A. GIDDINGS & CO., LIMITED

660 Dorchester West

MONTREAL

ELECTRICAL CONTRACTORS

Installations, Maintenance and Repairs

We can make your Motor Coils more cheaply for you as we have up-to-date Apparatus and Expert Workmen

MOTORS IN STOCK

3 Phase, 60 Cycle, Slip Ring Motors

H.P.	Volts	Speed	Maker
125	2200	900	Crocker Wheeler
5	550	720	G. E.
7 1/2	550	900	Crocker Wheeler
10	550	1200	Crocker Wheeler
40	550	865	Allis-Chalmers
40	550	865	Allis-Chalmers
40	550	720	Allis-Chalmers
40	550	1200	Vert. Gen. Elec.
50	550	600	Crocker Wheeler
75	550	1200	C. G. E.
175	550	600	Triumph
200	550	600	Allis-Chalmers
125	550	900	Crocker Wheeler

Direct Current

H.P.	Volts	Speed	Maker
1/8	110	1800	C. G. E.
1/4	110	1800	C. G. E.
1	125	1800	Toronto Hamilton
1	110	1800	Lincoln
17	110	1100	Toronto Hamilton
20	110	730/1250	Siemen's Bros.
1/7	220	900	Spragg
1/2	230	1150	Rob. & Myers
1	230	1300	Triumph
3	220	530	C. G. E.
3 1/2	250	1550	C. G. E.
4	220	1125	Can. West.
5	220	950	C. G. E.
10	230	1400	Fort Wayne
20	220	640	C. G. E.
20	220	800	C. G. E.

8 K.W. Gen. 3 Ph. 60 Cycle 550 V. Fairbanks.

Also a full line of Squirrel Cage. Motors 550 V. 3 phase, 60 cycle, 1/2 hp. to 100 hp.

YOUR INSPECTION IS INVITED

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

FOR SALE—One Corliss Engine, 50 H.P., in first-class shape. A. E. Howard, R. R. No. 1, Camborne, Ont. 4

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1. Walter Clinton, Welland, Ont. 22-7

Reliable Manufacturers. Agents in Vancouver are desirous of adding some strong agencies for electrical equipment or specialties to their list. We would like to hear from any manufacturer who is desirous of placing his product in British Columbia. Electrical News, Box 88, 212 Winch Bldg., Vancouver. 3-6

Motors for Sale

Large stock of 25 cycle and 60 cycle Motors, consisting of Westinghouse, Crocker-Wheeler and C. G. E. makes. Motors purchased from American Government and have seen little or no use. Attractive prices.

Apply—L. S. Tarshis & Sons,
400 Front St. East,
2-5 Toronto, Ont.

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-t.f.

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

Electrician, wireman, good all-round man would like a change, permanency preferred, conduit knob and tubes, casing, motors, telephones and alarms, new and old, work, plans and estimating; also good general mechanical experience; 25 years' British and Canadian experience; age 30; married. A. F. Hodges, 424 11th St., Medicine Hat, Alberta. 3-4

Construction of State College at Saltillo.

Property has been purchased in Saltillo, Coahuila, Mexico, for the construction of a new State college, which is to cost about \$250,000. Already \$150,000 of this amount has been pledged by the Federal Government, and it is expected to raise the balance through private subscriptions and through the aid of the State government.

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	75	3	25	550	480	Westg.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	60	550	600	C.G.E.
"	1	50	3	60	550	970	Westg.
"	2	50	3	25	550	720	Westg.
New	2	25	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	Tor. & Hm.
"	2	30	3	25	550	720	Westg.
"	1	25	3	60	220	720	Cr. Wh.
"	1	15	3	25	550	1450	Westg.
New	1	15	3	25	550	1400	Lanc.
"	1	15	3	25	550	750	Lincoln
"	6	15	3	25	550	720	Westg.
"	2	10	3	25	550	720	Westg.
Used	1	7 1/2	3	25	220	1500	Tor. & Hm.
"	1	7 1/2	3	25	550	1450	C.G.E.
"	1	7 1/2	3	25	550	700	Lanc.
New	1	7 1/2	3	25	550	725	Westg.
"	1	5	3	25	550	1440	Excelsior
"	1	5	3	25	550	710	Wagner
Used	1	5	3	60	200	1120	Westg.
New	3	3	3	25	550	1500	Lanc.
"	5	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
"	2	2	3	25	550	1440	Excelsior
"	2	2	3	25	550	1425	Lanc.
"	2	2	3	25	550	1300	Lanc.
"	3	2	1	25	110	1440	Wagner
"	1	1 1/2	1	25	110	1440	Wagner
"	1	1 1/2	1	25	110	1420	Wagner
Used	1	1	3	25	220	1500	Tor. & Hm.
New	1	1	1	25	110	1440	Wagner
"	1	1	3	25	550	1425	Lanc.

Write for Prices

H. W. PETRIE, Limited

131 Front St. West - Toronto Ont

Can We Help You ?

There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

INFORMATION WANTED

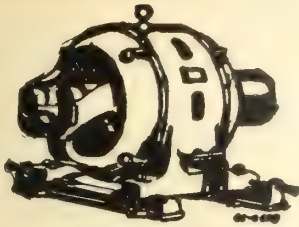
Electrical News,
347 Adelaide St. West,
TORONTO.

Date.....19

Please tell me

Name

Address



Machines In Our Montreal Stock

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new "Kuhlman" Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately three to four weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.

- 1—300 H.P. 300 RPM.
- 2—300 H.P. 490 RPM.
- 1—100 H.P. 600 RPM.
- 2—75 H.P. 1200 RPM.

3 Phase 60 Cycle 550 Volt.

- 2—200 H.P. 600 RPM. Slip Ring.
- 1—100 H.P. 600 RPM. Slip Ring.
- 1—100 H.P. 600 RPM.
- 2—75 H.P. 900 RPM.
- 1—50 H.P. 900 RPM. Slip Ring.
- 4—50 H.P. 900 RPM.
- 3—50 H.P. 1200 RPM.
- 2—40 H.P. 1200 RPM.
- 4—35 H.P. 1200 RPM.
- 4—35 H.P. 900 RPM.
- 1—35 H.P. 600 RPM.
- 3—30 H.P. 1200 RPM.
- 2—30 H.P. 900 RPM.
- 1—25 H.P. 900 RPM.
- 1—25 H.P. 1200 RPM.
- 1—20 H.P. 900 RPM.
- 2—15 H.P. 900 RPM.
- 1—15 H.P. 1200 RPM.
- 1—10 H.P. 1800 RPM.
- 2—10 H.P. 1200 RPM.
- 3—10 H.P. 720 RPM.
- 1—8 H.P. 810 RPM. Crane
- 2—7½ H.P. 900 RPM.
- 7—7½ H.P. 1200 RPM.
- 2—7½ H.P. 1800 RPM.
- 3—5 H.P. 900 RPM.

- 3—5 H.P. 1200 RPM.
- 14—5 H.P. 1800 RPM.
- 1—4 H.P. 1140 RPM. Crane
- 22—3 H.P. 1800 RPM.
- 12—3 H.P. 1200 RPM.
- 15—2 H.P. 1800 RPM.
- 14—2 H.P. 1200 RPM.

3 Phase 60 Cycle 440 Volt

- 2—50 H.P. 900 RPM.
- 8—30 H.P. 900 RPM.
- 2—30 H.P. 850 RPM.

Single Phase 30 Cycle 110/220 Volt

- 2—1/8 H.P. 1415 RPM.
- 2—1/6 H.P. 1750 RPM.
- 1—1/2 H.P. 1420 RPM.

3 Phase 60 Cycle 220 Volt.

- 1—75 H.P. 900 RPM.
- 1—60 H.P. 900 RPM.
- 2—50 H.P. 900 RPM.
- 2—40 H.P. 900 RPM.
- 1—25 H.P. 900 RPM.
- 1—20 H.P. 1200 RPM.
- 1—15 H.P. 1200 RPM.
- 1—15 H.P. 1150 RPM. Slip Ring
- 3—10 H.P. 1800 RPM.
- 2—7½ H.P. 1750 RPM.
- 3—7½ H.P. 1200 RPM.
- 2—5 H.P. 900 RPM.
- 5—5 H.P. 1200 RPM.
- 2—3 H.P. 1200 RPM.
- 1—2 H.P. 1200 RPM.

Single Phase 60 Cycle 110 Volt.

- 2—7½ H.P. 1800 RPM.
- 3—5 H.P. 1800 RPM.
- 10—3 H.P. 1800 RPM.
- 1—3 H.P. 1165 RPM.
- 1—2½ H.P. 1800 RPM.
- 11—2 H.P. 1800 RPM.
- 3—1 H.P. 1800 RPM.
- 4—3/4 H.P. 1800 RPM.
- 23—1/2 H.P. 1800 RPM.
- 15—1/3 H.P. 1800 RPM.
- 45—1/4 H.P. 1800 RPM.
- 21—1/6 H.P. 1800 RPM.
- 1—1/6 H.P. 1200 RPM.
- 7—1/8 H.P. 1800 RPM.

D. C. MOTORS & GENERATORS

- 1—40 H.P. 220 Volts.
- 1—35 H.P. 220 Volts.
- 1—17 H.P. 110 Volts.
- 1—8½ H.P. 125 Volts.
- 1—8 H.P. 120 Volts.
- 2—1/6 H.P. 32 Volts.

TRANSFORMERS

- 1—40 K.V.A. 2200/110 Volts.
- 1—30 K.V.A. 2200/110 Volts.
- 2—25 K.V.A. 2200/550 Volts.
- 2—15 K.V.A. 2200/550 Volts.
- 5—10 K.V.A. 2200/550 Volts.
- 6—7½ K.V.A. 2200/550 Volts.
- 5—5 K.V.A. 2200/550 Volts.
- 1—3 K.V.A. 2200/550 Volts.
- 2—6 K.V.A. 2200/110 Volts.

If your requirements are not listed above, kindly communicate with us, as our stock is changing day by day.

Electric Motor and Machinery Co., Limited 417 St. James St., Montreal, Que.
Tel. Main 2177—Main 18. Night Call Rock.3523



Synchronous Motors Available in Canada for Immediate Shipment

1—385/500 K.V.A., 3 phase, 60 cycle, 2300 volt, Canadian General Electric Synchronous Motor, 1,200 RPM. With direct connected Exciter and very complete Switchboard. Brand New, never been used.

1—350 K.V.A., 3 phase, 60 cycle, 600 volt, Westinghouse Synchronous Motor, 514 RPM.

With Exciter and Switchboard. Condition equivalent to new.

1—250/300 K.V.A., 3 phase, 25 cycle, 2,300 volt, Westinghouse Synchronous Motor, 237 RPM. with coupling. Suitable for generator operation. In use four years, in excellent condition.

MacGovern & Co., Inc. 285 Beaver Hall Hill, Montreal

Offices: New York, Pittsburgh, Seattle

Works at: Linden, N. J.

Buyers and Sellers of New and Used Machinery
A CONTINENT-WIDE SERVICE

Motors in Stock

- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
- 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
- 1 10 hp. C.W. 750 rev., starter, rails, pulley.
- 1 5 hp. C.W. 1500 rev., starter, rails, pulley.

- 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
- 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
- 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.

- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
- 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
- 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
- 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
- 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
- 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.

- 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
- 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.

- 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
- 3 ½ hp. 1200 rev. clutch type T.H.E.
- 1 1 hp. 1800 rev. split phase Peerless.

- 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
- NEW SINGLE PHASE MOTORS in STOCK—REPULSION

- 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
- 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
- 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
- 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
- 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
- 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
- 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
- 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.

SPLIT PHASE

- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
- 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
- 4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
- 4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
- 4 ½ hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited

HAMILTON

ONTARIO



The Cleveland Fare Box Prevents Mistakes

It is the one sure method of collecting fares without possibility of mistakes or losses in any way.

THE CLEVELAND FARE BOX is an important advancement in street car service to the public in safeguarding the interests of the municipality or company, and in saving time and labor.

Write for further important facts regarding this practical and valuable means of collecting fares.

Canadian Cleveland Fare Box Co., Ltd.
PRESTON, ONTARIO

Agent for the Arthur Power Saving Recorder for
Western Provinces

Canadian Representative, Universal Lubrication.
Tulc.

Electrical Machinery and Repairs



Standard Armatures, Coils and Commutators in Stock. Material and Experience for Quick Thorough Repairs on Every Size or Type of A.C. or D.C. Machine.

Factory Recently Doubled. 100 Electrical and Mechanical Experts Anxious to Serve You

Cleveland Armature Works, Inc.

Est. 1895

Cleveland, Ohio

Inc. 1918

PEIRCE BRACKETS

Pole Line Hardware

The only licensed manufacturer in Canada of this well known high grade material is

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(Successor to Slater & Barnard, Ltd.)

HAMILTON, Ontario

Made in Canada Under Peirce and Hubbard Patents

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Toronto

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Established 1885

Published Every Wednesday

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Double the Life of Your Pole Lines

By using our

OPEN TANK TREATED

British Columbia Cedar Poles

They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices. No obligation.

Lindsley Brothers Canadian Co., Ltd., Nelson, B. C.

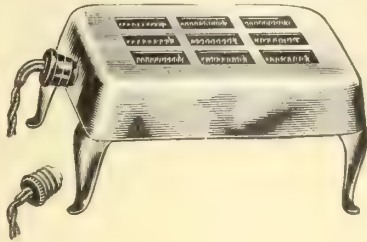
Filer-Smith Machinery Company, Limited,
708 Confederation Life Building, Winnipeg, Man.

Irving Smith, 602 New Birks Building, Montreal.

"RED HOT"

—Electric—

HEATER and COOKER



What It Is


An electrical appliance made from cold rolled steel, nickel plated. It is seamless, well constructed and guaranteed for one year. Equipped with eight feet of cord and detachable plug. The "Red Hot" Heater is approved by the Hydro Electric Power Commission of Ontario, approval No. 33.

What It Does

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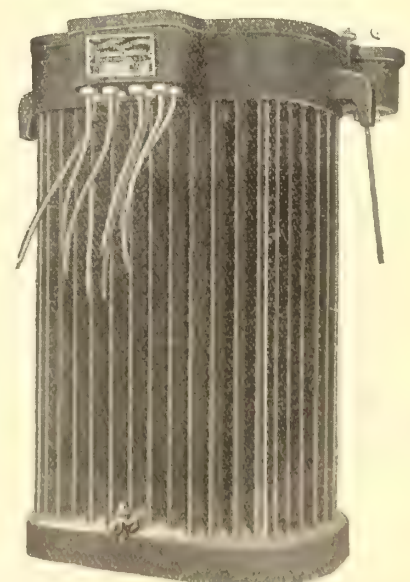
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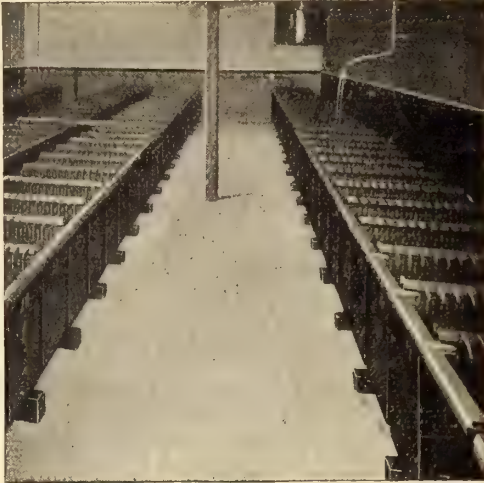
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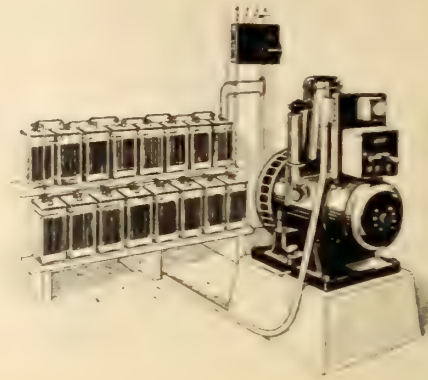
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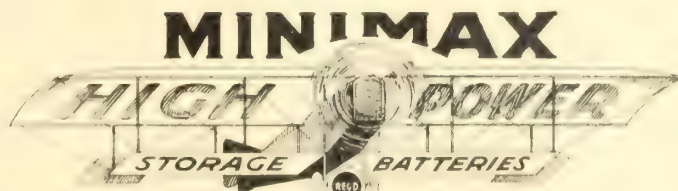
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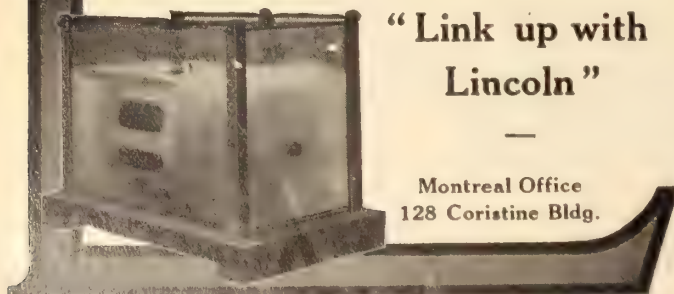
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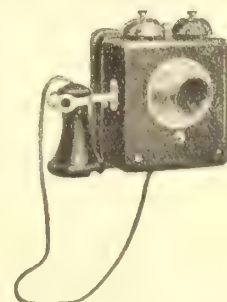
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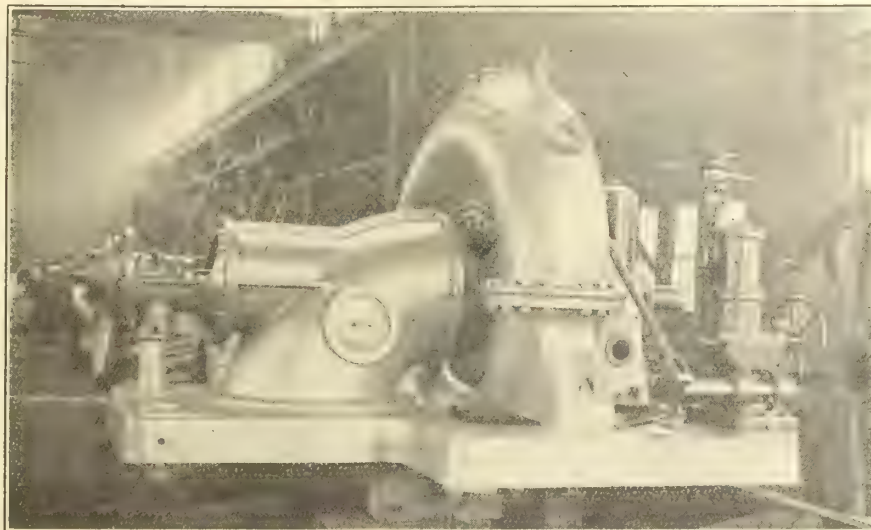
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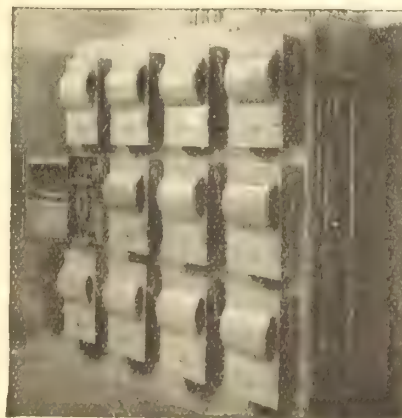
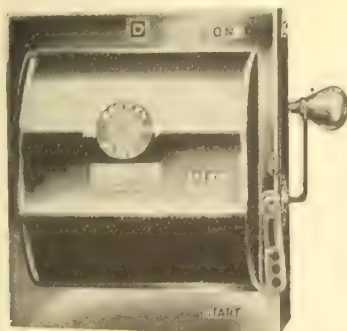
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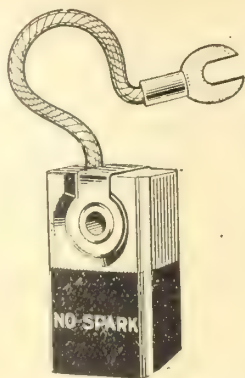
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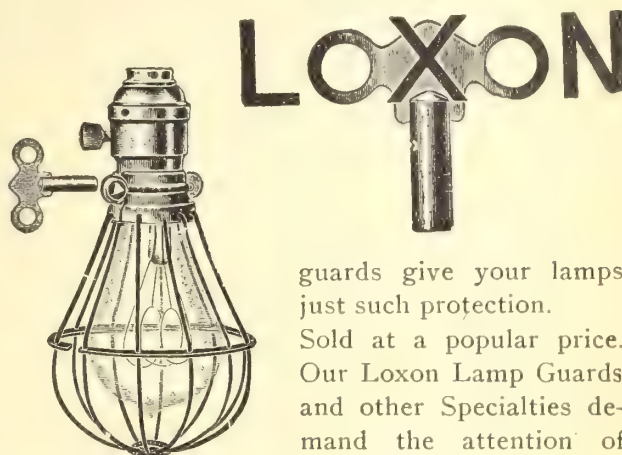
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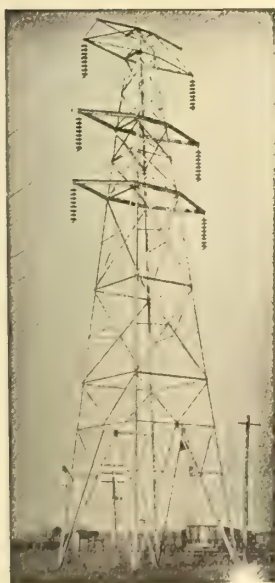
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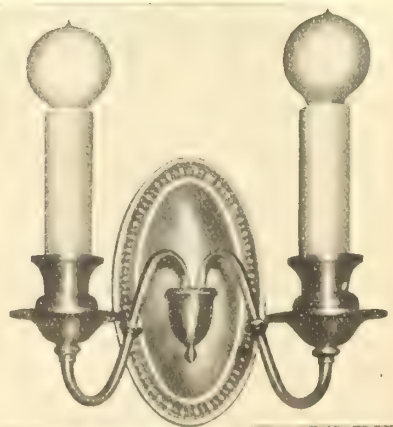
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Canadian Drill & Electric Box Company
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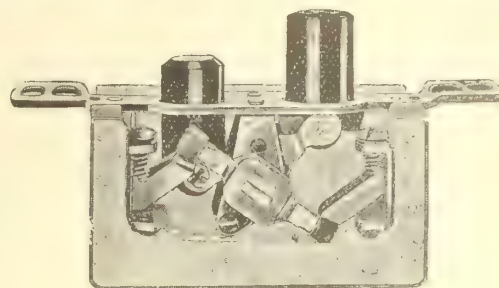
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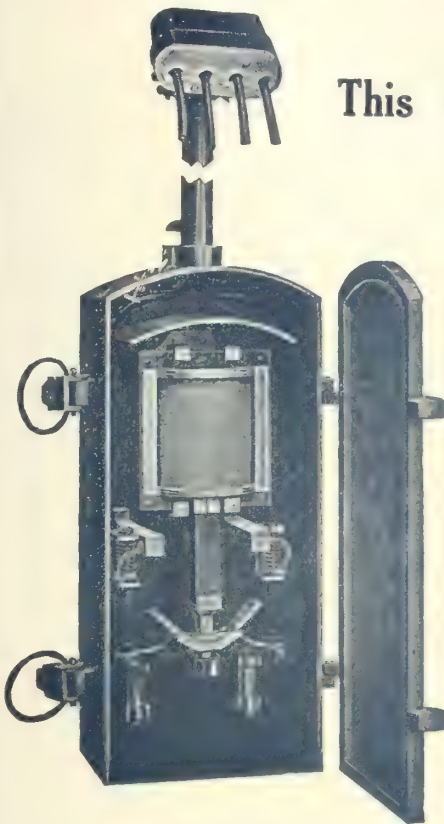
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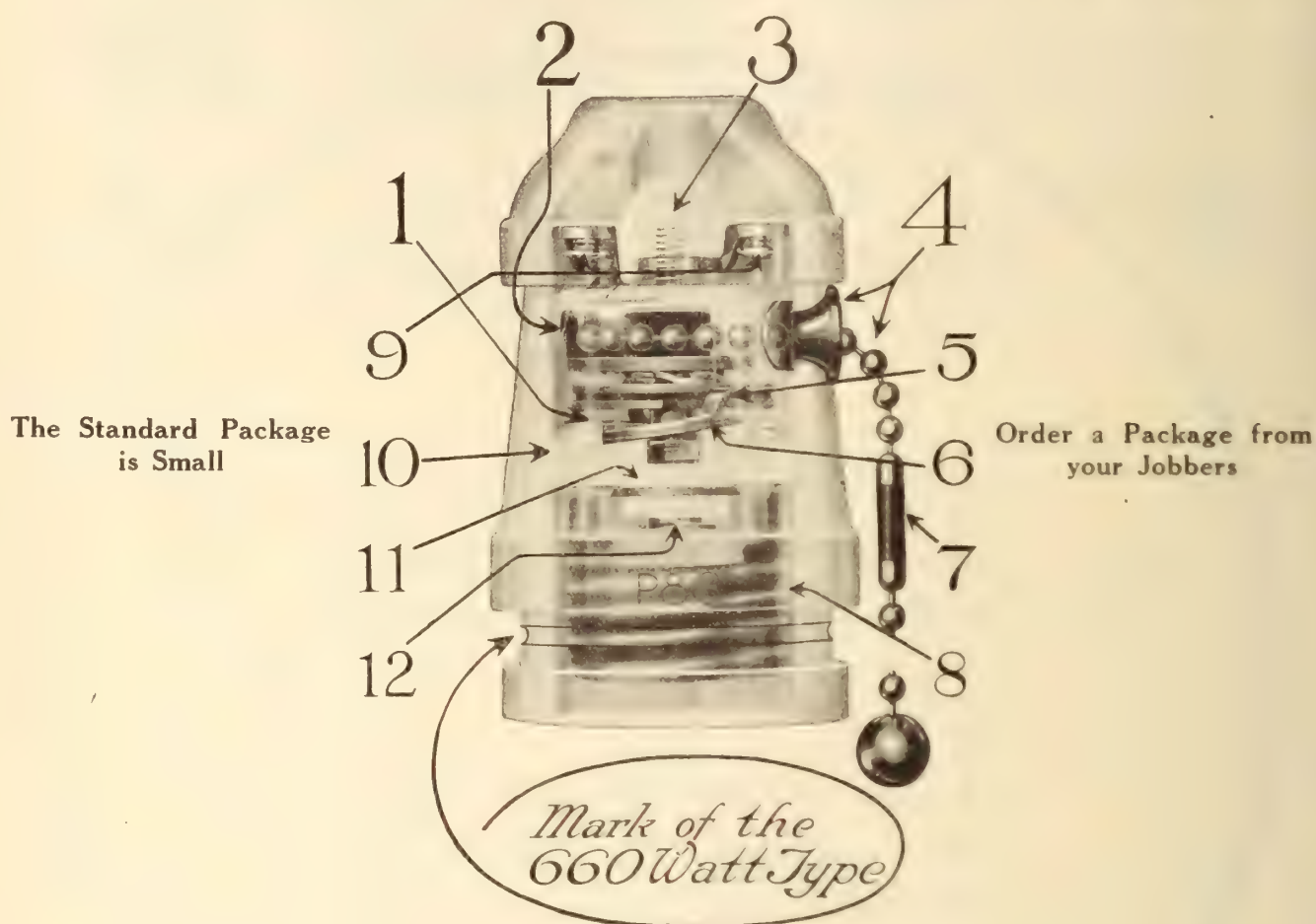


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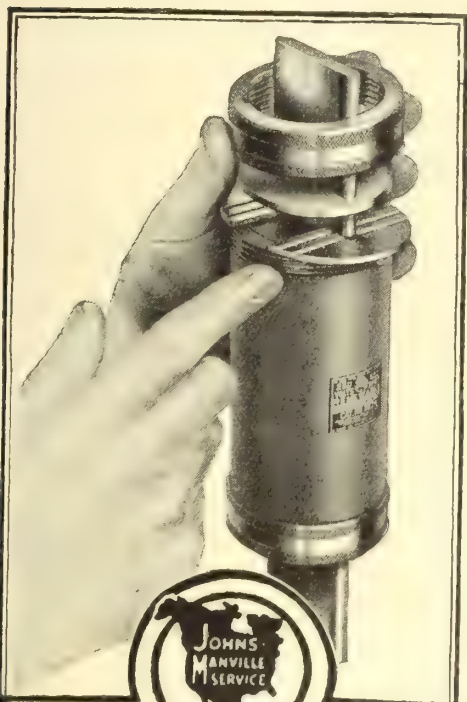
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Note the appearance of "Noark" Renewable Fuses

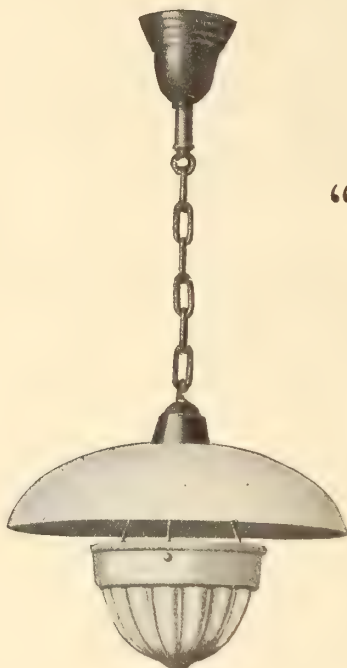
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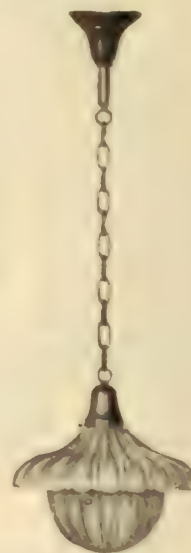
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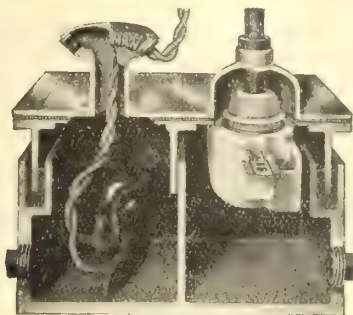
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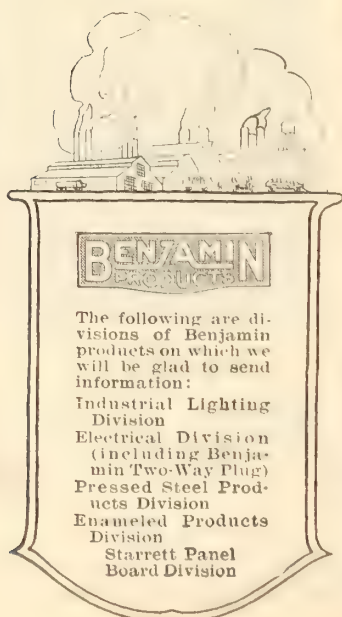
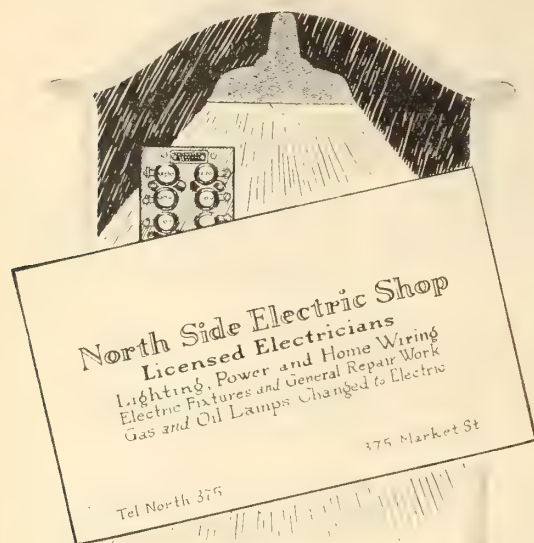
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In October, November and December, with our co-operation,

their sales immediately grew to double that number. And, of the 28 Hoovers they averaged each month, 24 were "Specials"

Such a showing as this, in the face of the fact that three other large and progressive dealers in Hamilton are also operating under the same plan, has converted even this veteran Hoover dealer to the value of our full selling co-operation.

Certainly such evidence is conclusive proof. And there are many other instances, in every province, which support our statement that the Hoover plan operates profitably whenever a dealer will but properly co-operate.

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and Executive Offices: Hamilton, Ontario



The HOOVER

It Beats . . . as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

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Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

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Sangamo Electric Company's Plant, Toronto

"GALVADUCT"

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Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you—write us.

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TORONTO

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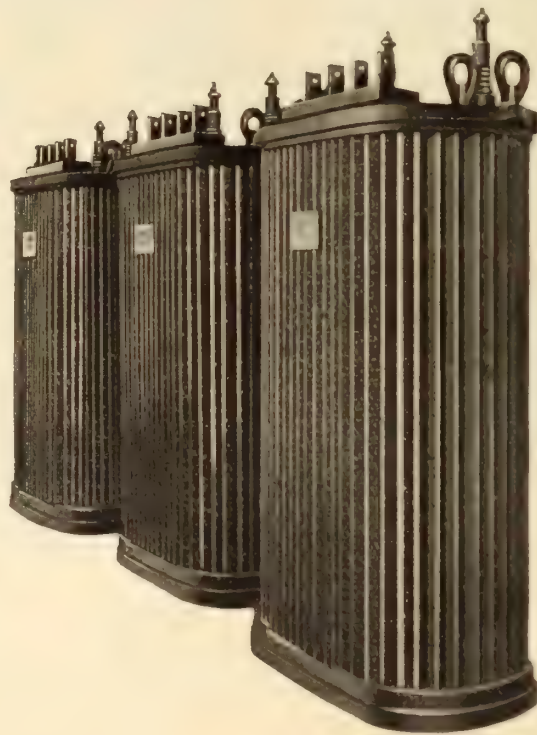
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Welded Steel Cases

We are the Originators

Foresight in arranging for ample supply of all necessary materials entering into the manufacture of Transformers enables us to make prompt shipments of all standard sizes from stock.



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We give service.

Steel Bottom Welded to Corrugations — Cannot Leak
Other Exclusive Features in Mechanical and Electrical Design

Others may follow but we lead

The Packard Electric Co., Limited

St. Catharines, Ontario

401 Temple Building, Toronto

725 Power Building, Montreal

Confederation Life Building, Winnipeg

Agents:

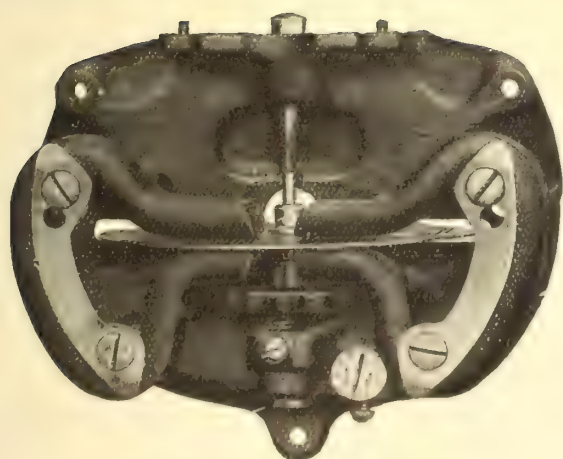
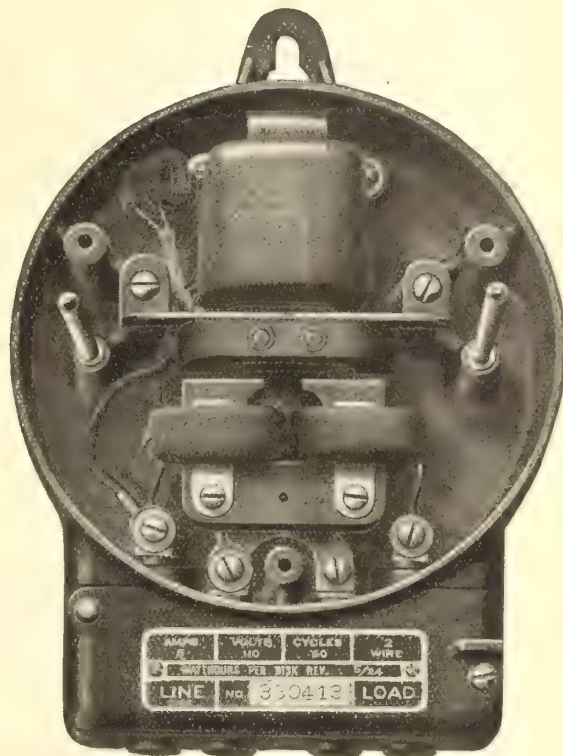
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J. T. Warren, 738-11th St. West, Calgary, Alta.

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Ask for Bulletin No. 4618.

Sangamo Electric Company
of Canada, Limited

2098

Factory: TORONTO

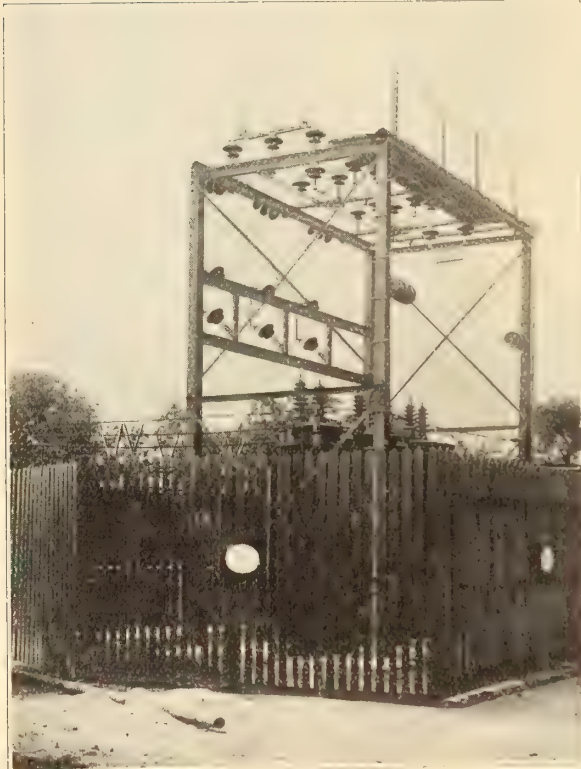
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HIGH TENSION EQUIPMENT



**THERE ARE MANY GOOD REASONS
FOR USING "UNIT-TYPE" EQUIPMENT
BUT AN ESPECIALLY GOOD ONE
IS** That "UNIT-TYPE" Equipment
is a DELTA-STAR Product



Unit Type, 33000 Volt, 450 K.V.A., Steel Tower Substation

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5 K.W., 13200 110 220 Farm Substation

Very naturally a variety of reasons enters in to the selection of Unit-Type equipment by engineers. Many are attracted by the design, others by its simplicity of construction, all-round usefulness and reliability.

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Reputations are not built in a day, and do not happen through accidents. The DELTA-STAR reputation has been built up by the following policy—since 1908

Build equipment as good as human skill can build, and let responsibility for quality exceed every other responsibility. This is the principal on which DELTA-STAR does business with you.

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Electric Clothes Washer

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Have you secured your BlueBird license? Many of the leading hardware and electrical jobbers of the Dominion are realizing real profits and placing themselves in a dominant position through BlueBird.

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Our new jobbing arrangement will take over all dealer connections, which will be handled through a highly localized distributing system, ensuring prompt deliveries and individual attention.

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Buy a BlueBird and reap
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Every contractor and wireman in the business needs this new Hand-Book—the most complete book ever issued on the subject of metal raceways for surface wiring. It gives full instructions—with many illustrations—for using National Metal Molding under all conditions. It also lists the various fittings and devices that are used in connection with Metal Molding. Because of its convenient size, the book can be easily carried and used right on the job. We will be glad to send you a copy, without charge. Write, or use the coupon below.



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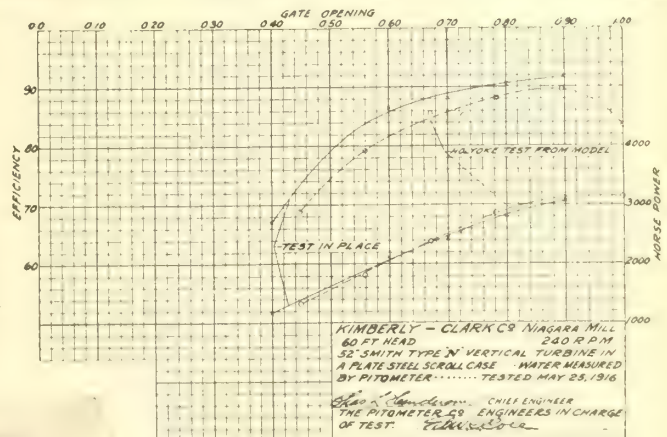
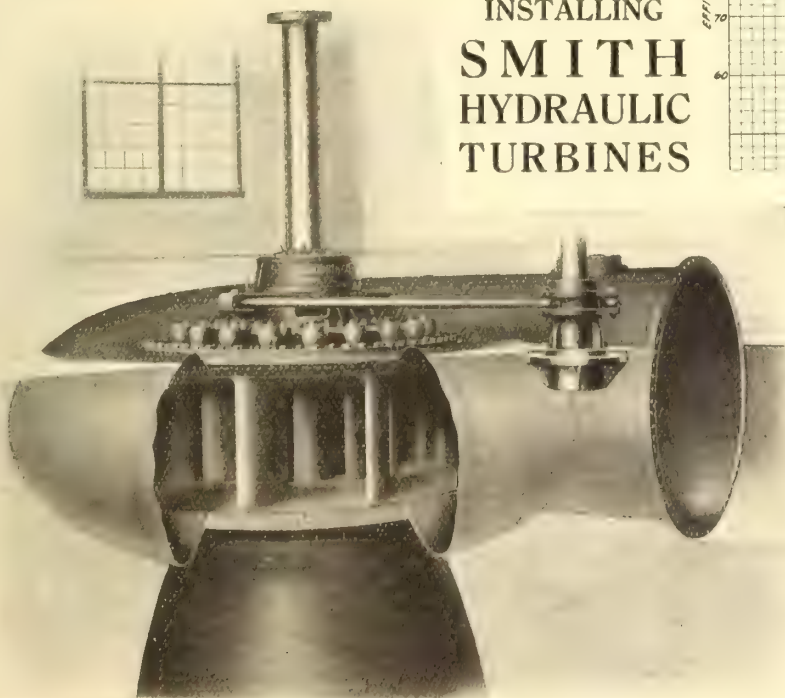
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INSTALLING
SMITH
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TURBINES



The year 1921 has on its program an immense amount of

**WATER POWER
DEVELOPMENT.**

If interested, ask for Bulletin "N"

S. Morgan Smith Co.
York, Pa., U. S. A.

H. B. VAN EVERY, Representative
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A Complete Battery Charging Panel for 40 Volt Service

Charges 6 and 12 volt starting and lighting batteries.

Maximum charging rate, 15 amperes, tapered to 2 amperes minimum.

Will handle one battery or a group of batteries in series up to the capacity of the supply line.

Price \$27.75, f.o.b., New York
Boxed Weight 30 lbs.



Ward Leonard Rheostats are made on cast iron bases with Vitrohm, vitreous enamelled insulation (solid, fireproof, non-absorbent), which insures permanent value—permits of highest ohms in given space—and with maximum heat dissipating capacity.

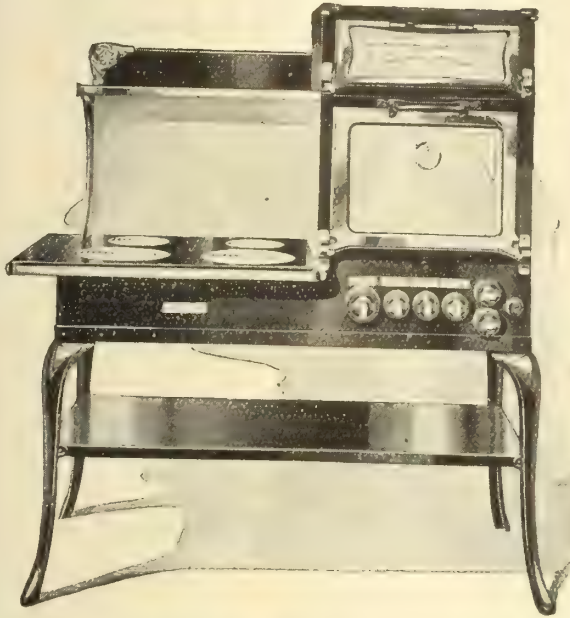
We make battery charging rheostats in a great variety of sizes—for independent or switchboard mounting with or without meters and other accessories. Standard sizes and types shipped from stock.

Ask for details.



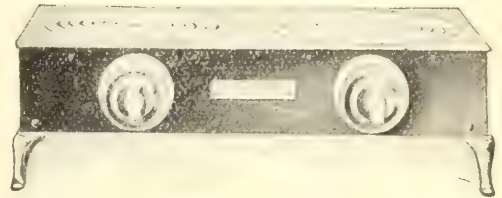
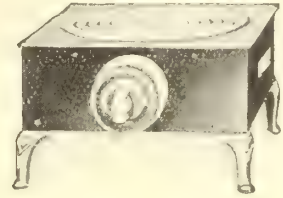
Ward Leonard Electric Company
Mount Vernon, New York

MOFFAT'S ELECTRA'S



A few reasons why you should handle Moffat's Electra's constructed with heavy Armco iron, four times the life of steel. Insulated double jointed nickle plated doors with white enamel panels, mercury or round compensating thermometer. Quick powerful burners, wire under the burners protected from moisture. Each burner supplied with individual covered cut-

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Used From Coast to Coast

On the most important jobs

MOLONEY TRANSFORMERS



3 Phase
POWER TRANSFORMER

They consistently meet the demand where reliable service is sought for; and their efficiency is proven by the universal satisfaction they are giving—a purely Canadian made product.



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MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, Confederation Life Bldg., Winnipeg.

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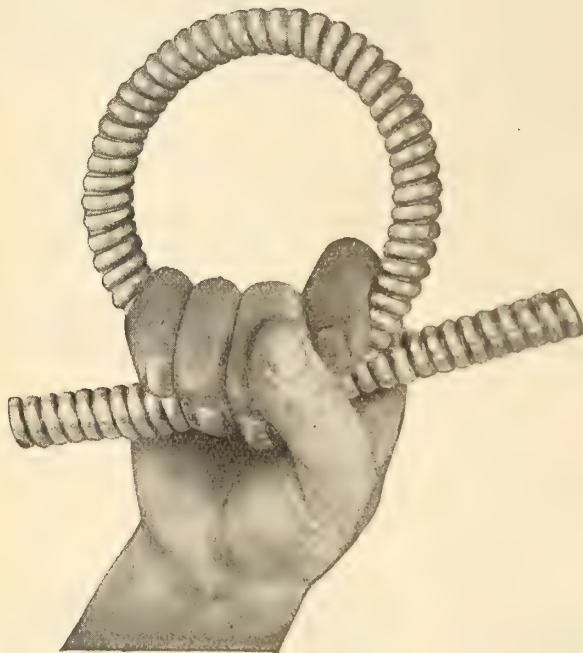
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Head Sales Office

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TRI-CABLE ADVANTAGES

The advantages of Triangle Products are many. Note the list of some of them. But best of all, see that you get these Quality Products next time you order.



TRI-CABLE

1. Costs less per foot than Conduit wire
2. Costs less to install than any other type of protected wiring.
3. Requires less cutting.
4. Makes a good finish at outlets.
5. Is impervious to nails unless held in a vise.
6. Outlet boxes are smaller and ceiling plates can be used, occupying less space than ordinary boxes.
7. Is impervious to damage by rats which unprotected concealed wiring is subject to.

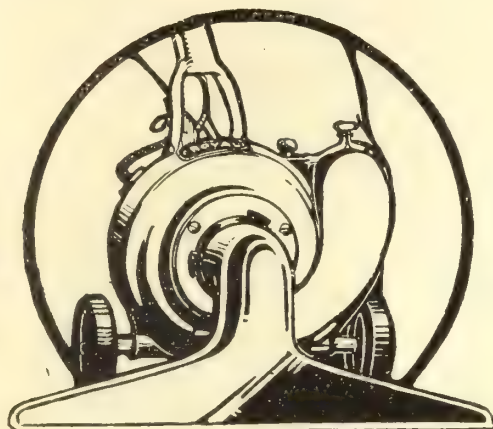
Quality, Service and Economy are what you are assured of by using Triangle Products. See that you get them.

Tri-Cable	(Flexible Steel Armored Conductor)
Tri-Steel	(Flexible Steel Conduit)
Tri-Duct	(Flexible Non-Metallic Conduit)
Tri-Hose	(Flexible Metallic Gas Hose)
Tri-Tube	(Flexible Metallic Automobile Tubing)
Tri-Cord	(Hard Service Portable Cord)

Exclusive Selling Agents:

Conduits Company Limited

33 Labatt Avenue - TORONTO



TIME and performance have served to strengthen the good opinion dealers and users have of the Royal Electric Cleaner. A larger number of dealers are exhibiting the Royal to discriminating shoppers this year, than ever before. They are taking advantage of an ever-growing demand for a **really good electric cleaner.**

Dealers sell the Royal, users choose it and owners prize it, for its simplicity.

The Royal "Clean By Air Alone," the accepted **right** cleaning principle, and it is built for a life-time of efficient and trouble-free service.

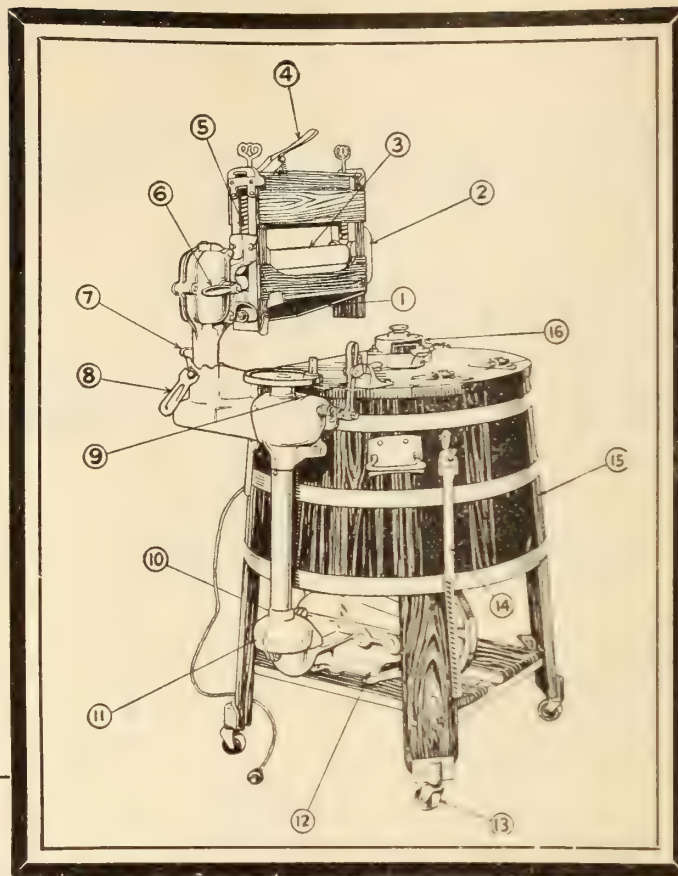


ELECTRIC CLEANER

Cleans by Air-Alone!

GREAT WEST ELECTRIC CO., LTD.
WINNIPEG

- 1—Reversible drain board.
- 2—Wringer gear covered.
- 3—12" highest quality rubber rolls.
- 4—Safety device to separate rolls.
- 5—Heavy wringer frame.
- 6—Operating lever for wringer to start, stop, or reverse rolls.
- 7—Safety catch prevents wringer swinging unless desired.
- 8—Swinging wringer tightener.
- 9—Lever to operate washing machine.



- 10—Belt tightener.
- 11—Gear covered.
- 12—Machine-out gearing run in hard oil.
- 13—Large tread swivel casters.
- 14—Rack bar on hook when cover open.
- 15—Extra heavy selected quality cypress tub.
- 16—Slusher post to be raised before lifting cover—open four-winged slusher used on this machine of most effective design.

The Cypress Tub that Stays Hot

The tub of the Connor Perfection Washer is of wood—an extra heavy selected quality Cypress.

The wisdom of this is appreciated by the housewife during the very first wash. For the wooden tub holds the heat and keeps the water hot, making it distinctly superior to the metal tub. Then there is nothing to corrode or become rusty—nothing to harm or soil the clothes—and remember, the Connor handles everything from the daintiest wearing apparel to the heaviest blankets

Just one of the 16 selling arguments which Connor dealers may use.

Shipments made from nearest point:—Ottawa, Ont., London, Ont., Winnipeg, Man. Address us at Ottawa.

For British Columbia, Address McPherson & Teetzel Co., Vancouver, B. C.

J. H. Connor & Son, Limited
OTTAWA, ONT.

We wish to advise our customers that until further notice we shall continue to accept Canadian funds at par, investing the same in Canadian securities.

The Cutter Company

Bank of Hamilton Building
Toronto, Ont.

Main Office and Factory:
Philadelphia, Pa.



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Circuit
Breaker
Engineers

Pre-eminent in the Electrical Field

TO guarantee the effective working of electric appliances and apparatus of any kind and to insure the safety of those handling them only the very best raw material must be used in their manufacture. Safety and dependability spell economy.

DIAMOND FIBRE

meets more of the necessary requirements for insulating material than any other material produced and is less expensive. It is hard and tough without being brittle. It will not break or crack like rubber or porcelain. It does not deteriorate under varying conditions of heat, cold, friction or vibration. Its electrical resistance is 200 to 400 volts per mil. of thickness. The possibilities of Diamond Fibre in the electrical field are unlimited.

Some of the uses where Diamond Fibre has conclusively proved its superiority.



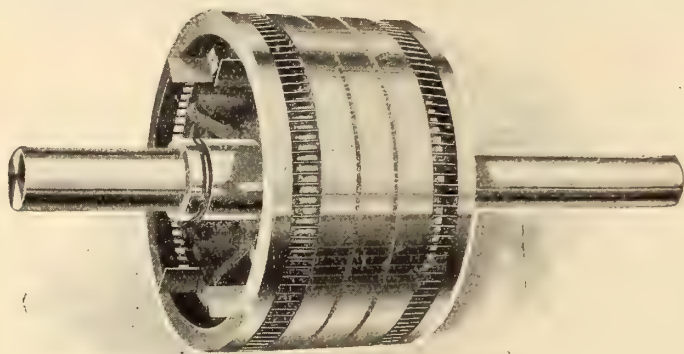
Insulation
Switch Handles
Lightning Arresters
Conduits
Bushings
Switch Bars
Cleats, etc.



There is a place in your manufacturing problem where Diamond Fibre can improve your product and decrease your production costs. Write for our book "DIAMOND FIBRE AND ITS USES"

Diamond State Fibre Company
of Canada, Limited

Wrigley Bldg., Carlaw Avenue, Toronto, Canada



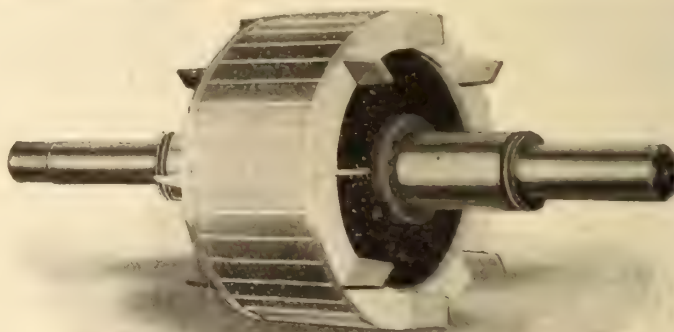
Cast Welded Rotor

A solid short circuiting ring is cast welded to the Rotor bars. Each bar is positively locked to the ring and becomes solidly welded to it. Failure between the two, which was the great and constant weakness of older designs, is therefore impossible. Used for larger motors.

Canadian Crocker-Wheeler "Cast Welded" and "Cast Winding" Rotor Construction, now in successful use for over three years, works one of the most important improvements in induction motor design of the squirrel cage type ever established. ∴

Cast Winding Rotor

In this, the Rotor bars, short circuiting rings and fans are all of the same material and are cast in a single operation. There are no rivets, screws or solder to come away. There can be no sparking or arcing between bars and rings. Means smoother running and longer life. Used for smaller motors.



Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

**THE CANADIAN
CROCKER-WHEELER CO.
LIMITED**

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL



Performance

SOMETIMES the inexperienced customer judges the power of a fan by the fuss and noise it makes when in operation. But when the demonstrator turns the switch of the R & M Fan and shows that it not only produces a strong breeze but, due to perfect balance and accurate fitting of the moving parts, it does this without vibration and unnecessary noise, he has made a sales argument which is always effective.

Another feature of R & M Fan performance which has a strong appeal is the fact that the breeze leaves the blades at an unusually wide angle. The area affected and the volume of air moved is, consequently, large as compared with the fan which drives the breeze at a narrow angle.

The dealer who demonstrates these points finds them a valuable sales help.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans

You Can Feel the Quality with Your Eyes Shut

You know—you just feel certain—that Quality exists in every New Canadian Beauty Electrical Appliance.

You can *feel* the Quality with your eyes shut. Open your eyes and you can *see* the Quality—in the sparkle of the highly polished nickel and in the trim, graceful lines.

The New

Canadian Beauty Electrical Appliances

For strength and construction nothing suits the New Canadian Beauty Line better than a shop test. Take one of our Toasters, for instance, and two or three others of other makes. Go over them all point by point, and you will find that the New Canadian Beauty Appliance will score every time.

This counts nowadays. Women know enough about electrical appliances to distinguish Quality appliances from those of inferior grade. And they can *see* and *feel* the Quality in the New Canadian Beauty line.

Your jobber can supply you—with promptness—or, if you prefer, order direct.

RENFREW ELECTRIC PRODUCTS, CO.,

Head Office and Work: Renfrew, Ont. LIMITED

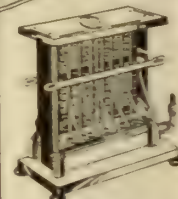
BRANCH OFFICES:

29 Richmond St. West, TORONTO, ONT.

803 Lindsey Bldg., WINNIPEG, MAN.

Renfrew
Electric
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Limited
Renfrew, Ont.

Canadian Beauty



Toaster

Canadian Beauty



Three-heat
Grill

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Iron

Canadian Beauty



Stove

Canadian Beauty



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For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, March 1, 1921

No. 5

Aluminium Steel-Cored Cable for High-Tension Transmission

The relative advantages of copper and aluminum for high tension transmission line work have been set forth from time to time by various advocates, but it now seems to be generally conceded that aluminum is showing advantages in actual practice not fully appreciated in the early days of the contest between these two metals. Special attention was drawn to aluminum with the introduction of the steel core stranded cable, and the latest developments in the production of the steel core have imparted to the aluminum cable characteristics that enable high voltage transmission lines, under certain conditions, to be built more economically and maintained with less effort and expense. This is more particularly true in rough country as brought out in a recent paper by Mr. Theodore Varney of the American Aluminum Company, in a paper read before the Toronto Section of the A.I.E.E. This paper is reproduced in this issue, and among the most important claims made for aluminum are the following two items:

1. The reliability of a high tension transmission line increases as the number of suspension points decrease. Mr. Varney's figures showed that in level country the aluminum span would be 725 feet as compared with 515 feet for copper, while in a rough country it would be 966 feet as against 483 feet, the latter figures representing a relative reliability in favor of aluminum of two to one.

2. The cost both as to installation and maintenance of the tower line is less for aluminum than for copper. While it is the case that the towers for the aluminum line are required to carry a heavier load and so must be more substantially built, the smaller number of them works out at lower total weight per mile, roughly only about 75 per cent. The smaller number of insulators also means fewer replacements. Plainly also the labor cost both of installation and maintenance should be kept below the corresponding items for a copper line.

Another point mentioned by Mr. Varney that formerly did not hold true is that aluminum now has an appreciable scrap value.

The discussion which followed the reading of Mr. Varney's paper brought from him an explanation regarding the ease and reliability with which aluminum can now be annealed and soldered. In transmission line work the McIntyre or the two point compression joint is most in favor.

Progress and Achievements In Radio Engineering

Mr. S. M. Kintner, vice-president of the International Radio Telegraph Co., delivered an able address in Hamilton, February 18th, on the subject, "Progress and Achievements in Radio Engineering," before a joint meeting of the Hamilton Branch of the Engineering Institute of Canada and the Toronto section of the American Institute of Electrical Engineers. The attendance was 175.

Mr. Kintner told of the new radio telephone service recently inaugurated by his company. They are now sending broadcast from Pittsburgh, Pa., at stated hours, musical concerts, news items and weather and market reports. This service is chiefly for the benefit of those having private or amateur radio outfits, and is sent by radio telephone, so that a knowledge of the Morse code is not required. The news items and reports reach country districts many hours before the nearest daily newspaper. The musical selections are sometimes specially rendered for this service by artists or orchestras, and sometimes the selections are the direct telephone transmission of public concerts being given in the city of Pittsburgh. Every Sunday evening the complete service of a prominent church in that city is sent out, including the musical anthems and the sermon. This has been listened to by private radio instruments as far away as Texas, Maine and Ontario.

It is evident that the day has already arrived when every member of the household of a country residence can listen directly to what is going on in the city, and it is easy to foresee the time when houses will have, besides a gramophone for entertainment, a wireless telephone for both news and entertainment.

Mr. Kintner stated that there are now seventeen transatlantic cables, nine of them being over thirty-five years old and therefore approaching their limit of useful life. Each of them cost many millions of dollars, but his company is now building a transatlantic radio station for about one-fifth of the cost of a submarine cable. A modern transatlantic radio station can now be said to be able to work every day in the year.

The railroads are considering radio telephones seriously, partly for regular train dispatching and partly for the new feature of speaking directly to the locomotive driver of a moving train, thus providing additional safety. Communication can also be provided between various points on the same train, a feature that would be valuable in the Rocky Mountains frequently.

At the close of his address, Mr. Kintner answered many questions propounded by the radio enthusiasts in the audi-

ence. The meeting concluded with an informal reception for the Toronto delegation and the guests from the Hamilton Technical School, who attended in considerable numbers. The meeting, which was held in the Westinghouse Auditorium, was presided over by H. U. Hart, chairman of the Hamilton Society, and F. R. Ewart, chairman of the Toronto Society.

Mr. Kintner also addressed the Electric Club of Toronto at their noon-day luncheon on Friday, speaking in much the same strain.

Montreal Electrical Luncheon Hears Dr. Eve

A very interesting address was given by Dr. A. S. Eve at the luncheon of the Montreal Electrical Club on February 16th. Dr. Eve chose as his subject, "The application of wireless telegraphy and telephony at sea during the world war," and read a few wireless messages which produced results of great magnitude all over the world. Dr. Eve related how lying wireless messages from the Goeben resulted in Turkey being drawn into the war against the Allies. He also told of the shelling of a wireless station by the Emden which resulted in the destruction of that ship, and of the movements of the German fleet being watched by means of wireless direction finders. The direction of Zeppelins by means of wireless signals from Germany was also described. Dr. Eve stated that the use of wireless telegraphy during the war was so extensive that he could but touch on only a few of its applications. Incidentally, Dr. Eve said that the greatest achievement of all times would be the use by the League of Nations of all recent inventions for the benefit of mankind, instead of their use for destruction, such as has been the case in the past.

Mr. C. Thomson, who occupied the chair in the absence of Mr. W. H. Winter, thanked the speaker for his excellent address. Two visiting guests were Mr. P. A. Hinds of Toronto, and Mr. P. L. Coddington, of Industrial Furnace Corporation, of Boston.

Progress of Wireless Telegraphy and Telephony

At the meeting of the Montreal Branch of the Engineering Institute of Canada, held on Feb. 17th, Mr. A. H. Morse, managing director of the Marconi Company, outlined the progress of wireless telegraphy and telephony since their first commercial application, and emphasized the fact that the development of wireless in Canada must keep pace with the general development of the country itself.

Mr. Morse pointed out the differences between the various methods of signalling at present employed on land, sea, and in air by means of the Fessenden oscillator, the diaphone and other apparatus.

He referred to the speed of wireless waves, their frequency and length. The phenomenon of resonance was dealt with at length, together with the compensating of attenuation by means of amplifiers. Continuous wave transmission has been employed for about five years. In order to produce sound in a telephone, other waves were superposed on the continuous waves, and the resultant "beat" or interference wave was rectified, whereas in the earlier days a condenser was employed to store up the energy received and allow it to leak out again to the telephone. Fessenden was the originator of the method of wireless wave transmission on the "heterodyne" (beat or interference) principle.

There was originally only one method of tuning to secure selectivity. The directional effect is now made use of, and in addition we tune very sensitively to the "note" or radio-frequency of the received signal.

Interference used to be a great source of trouble. To-

day there is practically no trouble due to this effect. The "duplex" system of sending and receiving at the same time is now quite a simple matter with the use of continuous waves, and moreover very high speeds are obtainable.

Mr. Morse showed the old coherer used 20 years ago, together with the latest development of the Fleming valve, otherwise called the "million dollar baby."

At the beginning of the war, Mr. Morse was working with a wireless direction finder, and he brought it to the notice of the British Government. Subsequently it was given its first official trial on Wimbledon Common, and the results were such that the invention was taken over by the War Office and its application became a secret for the duration of the war. The wireless direction finder was employed to locate the Zeppelins which carried out raids over England, and in France it gave the position of enemy wireless stations, while at sea it was also put to several uses.

The Dominion Government to-day employs the device at three stations on the Atlantic Coast in order to give incoming ships their position and guide them past dangerous zones.

Canada has always been in the lead in the application of telegraphy, continued Mr. Morse, and its trans-Atlantic wireless service, which has been in full operation for some thirteen years, was continually improving its speed and accuracy in transmission. The wireless telegraph service on the Great Lakes, in the Gulf of St. Lawrence and on the Atlantic and Pacific coasts was unequalled, according to the most experienced navigators. Canada's supremacy in the wireless field must be maintained. Canada established the first overland commercial service in the world, viz., that between Ottawa, Montreal and Quebec, and it was the speaker's privilege to have been in charge of that service in 1906.

Too many people, Mr. Morse said, regarded Canada as a thin strip of uninhabitable country, north of the United States, whereas it is a great, rich, fertile country, laid out in the path of the sun. Its skies are clear, its climate healthy, and its mineral and agricultural resources are unparalleled. The isolation of settlers from the towns was no longer necessary, for it was possible, with a small expenditure of money, to obtain a nightly bulletin of the world's news by wireless telegraphy or telephony, from the nearest large town within a radius of 500 miles.

The large gathering present was given a practical demonstration of wireless telegraphy and telephony, different kinds of signals, (tonic strain and continuous wave), speech and music being rendered easily audible by means of an amplifier. The aerial used was of the loop type, being only about 18 inches square, and supported just above the receiving set. The signals were sent from the Marconi station on William Street, and as the building in which the address was given is of reinforced concrete, the results obtained were very striking.

Electric Air Heating for Textile Mills

Mr. Wirt S. Scott, manager Industrial Heating Section of the Westinghouse Electric and Manufacturing Company, has an article in a recent issue of the *Electrical World* on the subject, "Unusual Industrial Heating Developments." One section of the article is given over to the electric air heating of textile mills, and in this connection cites a recent installation made in the Milltown mill of the Canadian Cotton Company in New Brunswick. In this installation Mr. Scott tells us a building 184 feet wide by 410 feet long, two storeys high, has installed a capacity of 2,200 kw. for maintaining a temperature of 65 degs. Fahr. within the building when the outside temperature is 20 degs. below zero. Another interesting statement made by Mr. Scott is that elec-

tricity can compete with coal, taking all the facts into consideration, when energy is obtainable at one cent a kilowatt hour and coal at \$8.00 a ton. An extract from this article, having special reference to the heating of this mill, runs as follows:

One of the most interesting and progressive steps made up to the present is the heating of a large textile mill electrically. It has been an accepted fundamental principle that electricity could not compete with coal for the heating of buildings. Recent investigations have been made, however, which show that electricity can compete with coal, taking all the facts into consideration, when energy is obtainable at 1 cent a kilowatt-hour and coal is \$8 a ton.

The Canadian Cotton Company of Canada, after a thorough investigation and examination, has entered into a contract for the electrical heating of one of the new mills it is building at Milltown, New Brunswick. The building is 184 ft. wide by 410 ft. long, two stories high, and has an installed capacity of 2,200 kw. for maintaining a temperature of 65 deg. Fahr. within the building when the outside temperature is 20 deg. below zero.

A hot-air system of heating is employed, this being recognized as the most effective manner of heating the building, besides providing good ventilation at all times. During the summer the system may be operated as a strictly ventilating system without the heat being on. This does not interfere with the humidifying system usually employed in textile mills, and as a matter of fact it should result in a more uniform humidity being maintained.

The heaters are concentrated into two centralized systems, one for each half of the building, and are placed in housings similar to those used with steam coils, the air being drawn through the heaters by a suction fan and distributed through the building by means of vent pipes.

Electric contact-making thermostats are used for maintaining the temperature constant within narrow limits. These, in connection with magnetic contactors, hold the temperature constant, continually and entirely automatically, at 65 deg. Fahr. throughout the entire twenty-four hours, irrespective of the outside temperature. The installation is thoroughly safeguarded, so that in the event of the power going off the motor driving the exhaust fans the current is automatically cut off from the heaters. It is further safeguarded to the extent that if the temperature within the heater housing goes beyond a predetermined limit the heaters are automatically disconnected from the line. In the event that the temperature within the room should go beyond a given point owing to the possible failure of the controlling thermostats a separately operated thermostat will cause the sounding of a loud gong, which will be sufficient to attract the attention of the watchman day or night.

By the electric heating of mills, particularly where water power is available, an enormous opportunity is provided for conserving natural resources, especially coal. It is to be hoped that steps will be taken at once by those companies fortunate enough to operate plants deriving their power from waterfalls, or those that purchase power from water-power plants, to investigate the advantages offered by means of electric heating.

The Utilization of Lignite Coal

On Feb. 9th, Mr. R. de L. French, of the Lignite Utilization Board of Canada, gave an address on the utilization of lignite as a fuel, at the weekly Montreal Electrical Club luncheon. Mr. W. H. Winter presided. The visiting guests were Mr. Harrison of Manchester, England; Mr. Burnet of Pawtucket, and Mr. G. W. Lawrence of Toronto. At the

conclusion of the luncheon, the question of affiliation with the Electrical Co-operative Association, Province of Quebec, was discussed.

Revenue of Laurentide Co. Passes Million Mark

According to the statement presented to the shareholders on February 15th, the gross revenue of the Laurentide Power Company for 1920 amounted to \$1,040,887, an increase of \$193,042 over 1919. The rate earned on \$10,500,000 share capital is 4.12 per cent. The company's expenses, \$174,094, show a decrease, and after deducting the usual \$375,000 bond interest, plus \$59,537, resulting from the adverse exchange rate of American funds, there remains \$432,255 applicable to the company's share capitalization. After deducting taxes and contingent funds, a deficit of \$16,463 is shown, reducing the preceding year's surplus of \$19,806 to \$3,343, which amount now stands at credit of profit and loss.

The operating expenses are only 5 per cent of the earnings, and total expenses, excluding bond interest and dividends, amount to only 17 per cent. of the earnings.

The balance sheet shows valuation of property at \$18,886,435, and total assets of \$19,272,683. Liabilities are as follows: capital, \$10,500,000; bonds, \$7,500,000; accounts payable, \$530,189; reserve, \$523,803; overdraft, \$215,347; profit and loss, \$3,342.00.

In the report it is pointed out that steady progress has been made on the extension of the power plant, and while this work has been somewhat delayed, it is expected that before July 1st of this year the two additional units will be in operation. This will bring the total capacity of the company's plant up to 165,000 horse-power.

Northern Electric Engineering Society

The Northern Electric Engineering Society met in Montreal on Feb. 14th in the Shearer Street Building to hear a lecture by Mr. W. B. Cartmel, M.A., B.Sc., on the Practical Uses of the Electron Tube.

The lecturer stated that the first practical use of electron transmission by means of heat was made by Edison after he had noted that a plate in an incandescent lamp bulb is affected by the electrons given off from a heated carbon filament. This had led to the use of bulbs or tubes of this sort as detectors, rectifiers, amplifiers, and a number of other electrical apparatus. Mr. Cartmel described these tubes with the help of lantern slides, and showed a Rectigon rectifier of $1\frac{1}{2}$ to $2\frac{1}{2}$ amperes working at 6 to 15 volts. Great improvement followed by the use of the Edison effect by Prof. Fleming as a detector in wireless telegraphy. The relation between current and voltage in this connection was explained by the lecturer.

In conclusion, Mr. Cartmel explained various methods of producing a vacuum in a glass tube, and how the degree of exhaustion could be measured.

Exemption for Hydro

Judge Ward, senior Judge of the County Court, has given his decision in the appeal of the Cobourg Hydro-electric Power Commission against its assessment upon which judgment was reserved at the local Court of Revision. His judgment is that the three residences occupied by employees and their pole yard recently established here are exempt from taxation as government-owned property. The Hydro consequently will pay taxes only on its business assessment.

The Use of Aluminium Conductors on Transmission Lines

The Relative Merits of Steel Cored Aluminium and Copper Conductors on Level and Rough Courses Discussed Before Toronto Section A.I.E.E.

By THEODORE VARNEY
Aluminum Company of America

It has become a platitude to say that the World War has sharply emphasized the dependence of mankind upon fuel. The privation resulting in those localities of the world where supplies of wood, coal and oil depend upon transportation, when such transportation is interrupted, has been clearly demonstrated. All over the world to-day men are engaged in studying means to overcome this economic danger. It is safe to say that the answer is, Electricity.

Practically for a generation people have been fond of prophesying the ultimate importance of Electricity, and in fact, such prophecies have been partially realized. Heretofore, however, especially favorable conditions had to exist to make electric power transmission projects attractive to the financier on account of the low cost of fuel. Today the field of electric power transmission has broadened into a world necessity.

Of first importance is the transmission of electrical power from natural resources of fuel or water power to those places where the consumers' demands are greatest. The secondary requirement is the electrification of transportation systems. Experts in the latter especially have said that probably in our generation the complete electrification of trunk line railways will not come to pass, but it is a practical certainty that the general operation by electricity of dense traffic terminals, heavy grades and tunnels, is immediately at hand.

I should like, if I may digress for a moment from the specific subject of this paper, to refer briefly to the development of systems for the supply of electric power to moving trains.

During the past eighty years, or more, railway engineers and operators have been engaged in developing the steam railway. In North America especially, the size and weight of trains has constantly increased, necessitating a corresponding development in engines and rolling stock. Increased weight and durability of rails and track construction have followed as a natural consequence. Rails weighing 120 lbs. per yard and rock ballasted road-beds are now in common use.

It was perhaps natural that when the electrification of steam railways was begun, overhead contact systems, patterned after the more familiar "trolley" roads should have been employed. It seems logical however, that the electrification of steam railways will never be satisfactory to the veteran operator until the overhead structure equals in stability and reliability the rolling stock and track.

The time is probably not far distant when a man walking along the top of a freight train in America will be a thing of the past. Hand brakes, except in yards, are of little use and telephone train lines or wireless communication may probably be employed between caboose and engine. The first result from the absence of men on top of moving trains is that the overhead contact line may be lowered and immediately many of the difficulties in collector design disappear. The reason for this is that there are many places, such as tunnels and overhead bridges, where the conductor

must be as low as 16 feet or less above the rails, while this is increased to 22 feet or more, as the practice is at present, the collecting device on the moving train must successfully maintain contact with the conductor throughout this range of height. At speeds up to 60, 70 or more miles per hour, this becomes a matter of extreme difficulty. That it is successfully accomplished at all is because both collector and overhead system are constructed with a maximum of lightness and flexibility at the expense of durability.

Some sort of "overhead third rail" operating at high voltage would fulfill the requirements. The first cost of such construction would probably be greater than that of the present type but greater safety, reliability and less cost of upkeep should result. A study of such structure would likely disclose advantages to be derived from the use of structural shapes made from high strength aluminum alloys.

Returning to the subject proper of Transmission Lines, the drift of engineering is already in the direction of increased durability and reliability. The increasing responsibility placed upon these lines has made it necessary. The primary requisite of a transmission line is the conductor. The supports and insulators are the adjuncts by which the conductors are maintained electrically clear of the ground and of themselves, although the complete line is impossible without all three.

In these days of very high voltages the line becomes more reliable in proportion as the number of points of insulation are decreased, provided the mechanical stresses at these points are kept within proper limits. Also the first cost will vary with the total number of insulators as well as the total amount of material for supports, together with the total labor of installation.

It is the object of this paper to point out the advantages to be derived in the first cost, reliability and efficiency of a transmission line by the use of a conductor embodying the following characteristics:

1. Requisite electrical conductivity.
2. Maximum elastic limit.
3. Maximum tensile strength.
4. Minimum weight.
5. Minimum corona.
6. Resistance to atmospheric deterioration.
7. High scrap value.

The purity of aluminum electrical conductor metal as commercially produced in the United States and Canada at the present time, is such that its conductivity in the hard drawn condition averages from 60 to 61% of the International Annealed Copper Standard. For comparison, the conductivity of hard drawn copper wire is taken at 97 per cent. On this basis the cross-section of an aluminum conductor must be 59 per cent. greater than a copper conductor having the same resistance per unit of length. The resistance of an aluminum cable steel reinforced is based upon the aluminum part only.

Another important feature is the reactance. The quantity of practical value is the total reactance of the circuit and

this is made up of the sum of the external and the internal reactances. The external reactance is a function of the diameter and spacing of the circuit and is independent of the material of the conductor. For average conditions as existing in modern transmission lines this quantity is on the order of 90 per cent. of the total reactance.

Efforts have been made in the laboratory to measure the internal reactance of steel reinforced aluminum cable. While experiments are still being carried on to determine this quantity with accuracy, the results so far show that for practical purposes the same methods as are used for calculating the total reactance of copper or all-aluminum circuits will be satisfactory.

In the form of wire the highest tensile strength per unit cross section is obtained at the present time with high carbon steel. Special alloy steels would perhaps give higher values but they do not appear at present to be commercially available for the purpose in hand.

A typical analysis for a suitable high carbon steel is as follows:

Carbon .....	.60% to .70%	both inclusive
Manganese .....	.50% to .80%	both inclusive
Silicon .....	.12% to .20%	both inclusive
Sulphur		Not over .04%
Phosphorous		Not over .04%

While the refinements of manufacture of acid open hearth steel appear to insure a somewhat more uniform product, the characteristics described herewith may be obtained from either acid or basic open hearth stock. Skill and care are necessary, however, in rolling, drawing, heat-treating and galvanizing, to produce the finished results.

The complete galvanized wire should stand the regulation sulphate of copper test. Four one-minute immersions are required for wires having a finished diameter over 0.094 inch. Three one-minute and one one-half minute immersions for sizes 0.094 inch to 0.074 inch, inclusive. Three for sizes smaller than 0.074 inch.

The ultimate tensile strength of the finished wire should be not less than 180,000 lbs. per square inch for any size.

The elastic limit should be not less than 130,000 lbs. per

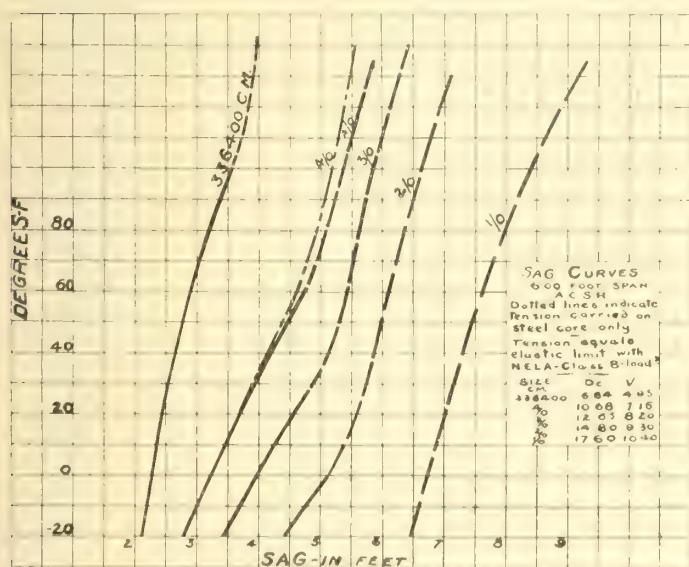


Fig. 1—Sag Curves, 600 ft. Span A.C.S.R.

square inch for any size. This point corresponds to the drop of the beam in the testing machine and is in reality the yield point.

While it is possible by merely hard drawing to produce these values of ultimate strength and elastic limit, the wire would be brittle unless it possessed in addition the following characteristics:

The ultimate elongation in 8 inches should be from 4 to 5 per cent. A bend test should be made in a vise having the jaws rounded off to a 3/16 inch radius. From the vertical position to 90 degrees to the right is counted as one bend. From the latter position to the vertical is counted as two. A bend 90 degrees to the left is counted as three and so on alternately until fracture occurs. Wires 0.188 inch in diameter should stand at least 4 bends and wires 0.053 inch in diameter should stand 41 bends with intermediate sizes in approximate proportion.

In addition the wire should stand, without fracture, 8 successive close turns around its own diameter.

Just as with other metals, the ultimate strength of alum-

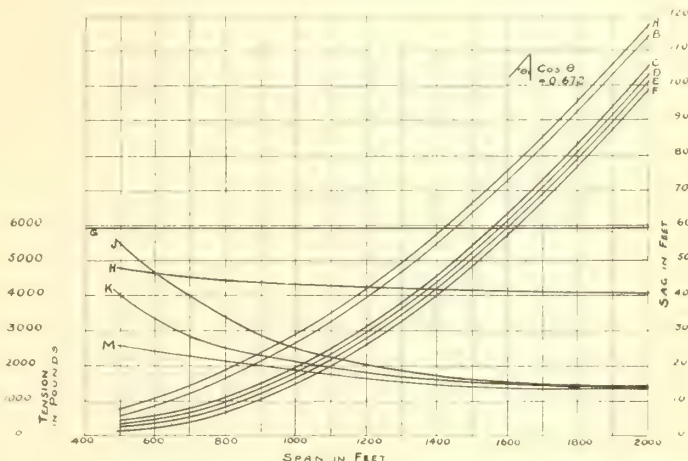


Fig. 2—4/0 A.C.S.R., Stranding 6x1880 Al/1x1880 St.—Sag and Tension
—Maximum Tension at 0°F. with 1/2" Ice and 8 lbs. Wind—5940
lbs.=Elastic Limit.

A=Sag in Plane of Resultant $\frac{1}{2}$ " Ice 8 lbs. Wind 0° F.

B=Sag in Vertical Plane $\frac{1}{2}$ " Ice No Wind 32° F.
C=Sag in Vertical Plane No Ice or Wind 120° F.

D=Sag in Vertical Plane No Ice or Wind 60°F

E=Sag in Vertical Plane No Ice or Wind 32° F.

F=Sag in Vertical Plane No Ice or Wind —20° F.
C=Terrain 1/4" Ice 2 lbs. W 1 20° F.

G=Tension $\frac{1}{2}$ " Ice 8 lbs. Wind 0° F.
H=Tension $\frac{1}{4}$ " Ice No Wind 22° F.

H=Tension $\frac{1}{2}$ " Ice No Wind 32°F .
J=Tension No Ice or Wind -20°F

K=Tension No Ice or Wind 32° F.

L=Tension No Ice or Wind 60° F.
M=Tension No Ice or Wind 100° F.

M = Tension No Ice or Wind 120° F.

inum wires may be increased by hard drawing, but this characteristic is produced somewhat at the expense of the ultimate elongation and conductivity. The usual value given for the ultimate strength of hard drawn copper is 60,000 lbs. per square inch, while the corresponding figure for aluminum wire is 24,000 lbs. per square inch. Both values vary slightly with the size of wire. The ultimate elongation of both copper and aluminum under these conditions is approximately 1½ per cent. The ultimate strength of a cable composed of aluminum and steel wires will correspond to the total load on the composite cable at the ultimate elongation of the aluminum.

In the published tables of aluminum cable steel, reinforced, it is usual practice to base the ultimate strength of the composite cable upon 24,000 lbs. per square inch for the aluminum and 160,000 lbs. per square inch for the steel. This conservative rating is intended to allow some leeway for manufacture and also to take care of variations in efficiency of the cable clamps. On this basis the ultimate strength of aluminum cable steel reinforced varies from 18 per cent. to 63 per cent. greater than the equivalent copper cable, depending upon the proportions of steel and aluminum.

The elastic limit of hard drawn copper wire is fixed by practice at 50 per cent. of its ultimate strength and the value of 30,000 lbs. per square inch is commonly used for the maximum allowable tension in service. The following method for defining the elastic limit of aluminum wire was adopted after many years of experience.

The sample of aluminum wire is placed in the testing machine and the weight set on the beam at a point corres-

ponding to a load of 20,000 lbs. per square inch. The machine is then run until the beam is lifted and then immediately stopped. The balance weight is then shifted toward the fulcrum of the beam until the point is found where the contraction of the sample will hold the beam out of contact with the lower stop for one minute. This point in a hard drawn aluminum wire having an ultimate strength of 24,000 lbs. per square inch corresponds closely to 14,000 lbs. per square inch.

The basis for the elastic limits given in the published tables of aluminum cable steel reinforced is, 130,000 lbs. per square inch in the steel and 14,000 lbs. per square inch in the aluminum. These values vary from 63 per cent to 135 per cent. greater than those of the equivalent copper cable.

The stress-strain curve of commercial hard drawn wire is not a straight line, although in the case of steel it is very nearly so. With copper as well as aluminum the curve is concave downward. If after reaching certain points on this curve the load is gradually reduced, the contraction of the wire will be along a straight line having a slope corresponding closely to 9,000,000 lbs. per square inch for aluminum, 16,000,000 lbs. for copper and 30,000,000 lbs. for steel. If the load be again applied gradually the elongation will follow the straight line back to the original maximum load. This characteristic of hard drawn wires has already been described in scientific papers.

The modulus of elasticity of a cable composed of a spiral bundle of strands when first subjected to stress is even more of an uncertain quantity on account of the slipping of the strands. If, however, a load be first applied, the contraction upon reduction of load will be along a straight line corresponding to practically the same modulus as the individual strands of which the cable is composed.

In the case of an aluminum cable steel reinforced the modulus will have a mean value depending upon the proportions of the two materials in the cable.

The coefficient of expansion of an aluminum cable steel reinforced is a mean between the corresponding values of its components. Its practical effect in a transmission line span must take into account the elongations of the steel and aluminum due to mechanical stress, because any change of length due to temperature produces a corresponding effect on the tensile stress in the component materials. A simple expression for this quantity has been worked out and is referred to later in this paper.

In the matter of weight an all-aluminum cable weighs 48 1/3 per cent. of the equivalent copper. Aluminum cable steel reinforced weighs from 67 per cent. to 81 per cent. of the equivalent copper depending upon the proportions of steel and aluminum.

The increased diameter of aluminum cables over the equivalent copper renders them especially available for those conditions where the corona effects must be taken into account. In this connection it may be mentioned that one of the large power companies in California has had an aluminum cable in test about one year under continuous corona discharge. No signs of deterioration whatever have been discovered.

In regard to the effects of the weather and atmospheric deterioration of aluminum cables, it must be borne in mind that no metal is entirely unaffected by all conditions which may exist. Hydrochloric acid and strong solutions of caustic soda or potassium will dissolve aluminum. If aluminum cables are installed in localities where vapors of these compounds are present they will go to pieces in time. Also if aluminum cables are brought into contact with copper or brass wires or clamps and subjected to moisture, the aluminum will be destroyed on account of electrolytic action. Galvanized iron or aluminum fittings must always be

used. There are many cases of aluminum cables installed over salt water on the sea coast, which have been in service for from ten to twenty years without deterioration whatever. Aluminum cables steel reinforced are in successful service along trunk line steam railways and samples removed after over five years' exposure to locomotive gases have shown no deterioration whatever either to the aluminum or to the steel core.

The uses of aluminum have now become so varied that the market demand for aluminum has become stabilized. There exists, therefore, at all times a scrap value for aluminum, varying with general market conditions. In this respect aluminum cable steel reinforced excels all forms of so-called "bi-metallic" wire, because of the ease with which the steel and aluminum may be separated.

In the practical application of conductor cable of any kind to transmission problems, the first consideration is its behavior when subjected to varying conditions of temperature and stress while hanging from its supports in the air.

To make use of the characteristics of aluminum cable steel reinforced just described, it is necessary in deflection calculations to start with the loaded condition and maximum

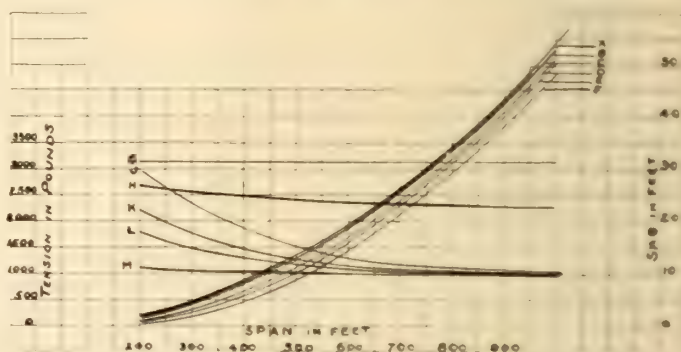


Fig. 3—2.0 copper cable, 7 strands, sag and tension. Maximum tension at 0° F. with 1/2" ice and 8 lbs. wind. 3150 lbs. = Elastic Limit.

A=Sag in Plane of Resultant 1/2" Ice 8 lbs. Wind 0° F.
B=Sag in Vertical Plane No Ice or Wind 120° F.
C=Sag in Vertical Plane 1/2" Ice No Wind 32° F.
D=Sag in Vertical Plane No Ice or Wind 60° F.
E=Sag in Vertical Plane No Ice or Wind 32° F.
F=Sag in Vertical Plane No Ice or Wind -20° F.
G=Tension 1/2" Ice 8 lbs. Wind 0° F.
H=Tension 1/2" Ice No Wind 32° F.
J=Tension No Ice or Wind -20° F.
K=Tension No Ice or Wind 32° F.
L=Tension No Ice or Wind 60° F.
M=Tension No Ice or Wind 120° F.

tension and determine the corresponding deflections and tensions with decrease of load, produced by rising temperature and disappearing wind and ice. If a new cable be installed according to a stringing chart calculated upon this basis the deflections after the first occurrence of heavy load would be greater than given on the chart. These differences would not be great and may usually be neglected because they are on the side of safety. If on account of special conditions it should be necessary to take them into account they can be provided for by previous calculations.

Since at the elastic limit a permanent set has been placed in the aluminum, it follows that if the tension in an aluminum cable steel reinforced be reduced sufficiently below this point the tension will be carried by the steel alone. This result could be produced in an installed cable by a reduction of the ice or wind load or a raise of temperature or by all three.

If it be assumed that the total tension in the cable remain constant, it can be shown by simple reasoning that the virtual coefficient of expansion of the cable may be given by an expression involving the coefficient of expansion, the modulus of elasticity and the relative areas of the component materials.

Fig. 1. gives the sag corresponding to various tempera-

tures in a 600 ft. span for five different sizes of aluminum cable steel reinforced. These are all based on the assumption that the elastic limit of the cable is reached at 0 deg. Fahr. with $\frac{1}{2}$ in. of ice and a wind pressure of 8 pounds per square foot of projected surface. The solid parts of the curves represent the condition when both aluminum and

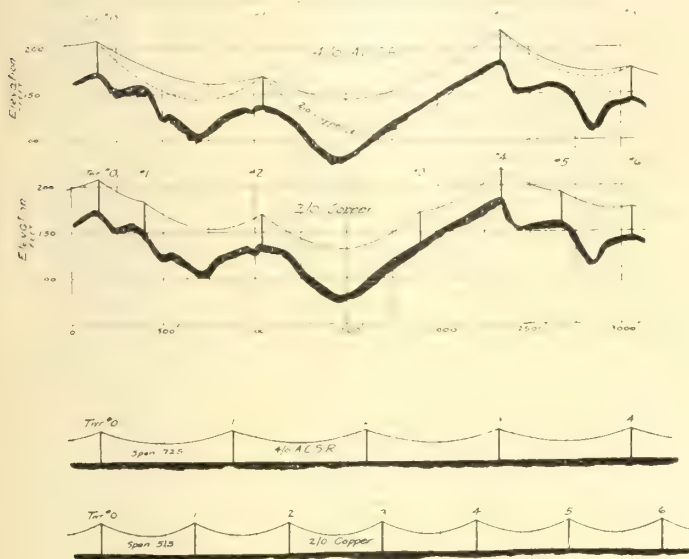


Fig. 4—Actual profile of Transmission Line.

steel are under stress. The dotted parts indicate the condition when the steel only is under tension.

As a check on the effect of using a constant value for the virtual coefficient of expansion, because the tension in the complete cable as a matter of fact, is not constant, the dot and dash line indicates the calculated sags with varying temperatures using a more laborious method. This method first assumes a new sag and then the temperature change required to produce it is calculated. The intermediate temperature points are then interpolated from the curve.

This might be called the absolute method and it will be noted that the more rapid, or approximate method produces results nearly the same, the variation being on the side of safety: i.e., greater sag. Both methods are based on the parabola.

Fig. 2. represents the tensions and corresponding deflections in 4/0 A.C.S.R. for various lengths of span, based

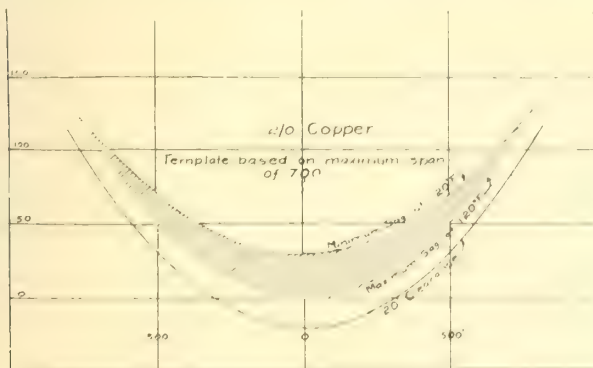


Fig. 5a—2/0 copper template based on 700 ft. maximum span.

on Class B loading. Fig. 3. gives corresponding data for the equivalent copper cable which is 2/0. Both these charts are based on the assumption that the ends of the span are anchored.

In order to illustrate the practical advantages of aluminum cable steel reinforced, a portion of an actual profile of a transmission line recently equipped with this material

is shown in Fig. 4. For comparison the figure also shows a level profile.

By inspection of Fig. 2 it is noted that the maximum vertical sag will occur with 4/0 A.C.S.R. at 32 deg. Fahr. with $\frac{1}{2}$ in. of ice and no wind. Similarly the maximum sag with 2/0 copper as shown in Fig. 3 will occur at 120 deg. Fahr. without wind. In both cases the minimum sag occurs at -20° deg. Fahr.

The next step is to select by a preliminary inspection of the profile the best average span length for the kind of conductor to be used. For 4/0 A.C.S.R. in this case this span is 1100 ft. For 2/0 copper it is 700 ft. From Figs. 2 and 3 the tension and sag corresponding to the maximum and minimum sag conditions are determined. Celluloid templates are next made for the maximum and minimum sag conditions. These templates are based on uniform tension in all span lengths for each case and they are made to the same scale as the profile.

Fig. 4 shows the tower locations obtained for the rough profile as well as for the level, assuming 20 ft. minimum ground clearance. Fig. 5 illustrates the method of using the templates. For the rough profile the maximum span for 4/0 A.C.S.R. is 1300 ft. and for 2/0 copper 850 ft. For the level country the span for 4/0 A.C.S.R. is 725 ft. and for 2/0 copper 515 ft.

In the case under consideration it is assumed that a double circuit steel tower line is to be built, to operate an 110,000 volts. The data upon which the towers are designed is as follows:

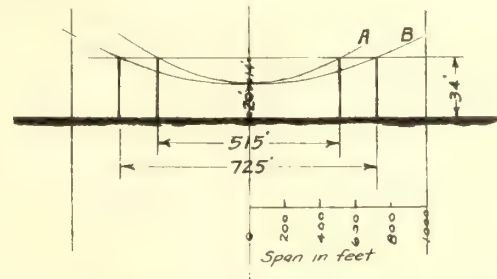


Fig. 5b—(A) Max. vertical sag 2/0 Copper at 120° F. Based on max. tension 3150 lbs. (Elastic limit) at 0° F. with $\frac{1}{2}$ inch ice and 8 lbs. wind. (B) Max. vertical sag 4/0 A.C.S.R. at 32° F. with $\frac{1}{2}$ inch ice. Based on max. tension 5940 lbs. (Elastic limit) at 0° F. with $\frac{1}{2}$ inch ice and 8 lbs. wind.

DATA FOR TOWER DESIGN

Cable Loading—Class B—Maximum Tension Occuring at 0° Fahr. With $\frac{1}{2}$ Ice and 8 lbs. Wind. Assume also 12 lbs. Wind on Bare Cable

	Ground Cable	
	4/0 A.C.S.R.	2/0 Copper
Diameter	$\frac{3}{8}$ inch	$\frac{3}{8}$ inch
Weight per ft. ....	.300 lbs.	.300 lbs.
Weight per ft.— $\frac{1}{2}$ " ice .....	.835 "	.835 "
Wind pressure per ft. with ice ....	.916 "	.916 "
Resultant weight per ft.	1.24 "	1.24 "
Maximum ground cable tension ...	5000 "	3000 "
	Conductor Cable	
	4/0 A.C.S.R.	2/0 Copper
Diameter .....	.564	.420
Weight per ft. ....	.295	.411
Weight per ft.— $\frac{1}{2}$ " ice .....	.946	.980
Wind pressure per ft. with ice ...	1.042	.947
Resultant weight per ft.	1.410	1.361
Maximum conductor cable tension..	5940 lbs.	3150 lbs.
Insulator side swing for 8 lb. wind on $\frac{1}{2}$ " ice	48°	44°
Insulator side swing for 12 lb. wind on bare cable	62°	46°

For Rough Profile

Strain towers	1 every 3 miles	1 every 3 miles
Semi-strain towers	1 every mile	1 every mile
Suspension towers	$4\frac{1}{2}$ per mile	10 per mile
Average span	966 ft.	483 ft.
Maximum span	1300 ft.	850 ft.

For Level Profile

Strain Towers	1 every 5 miles	1 every 5 miles
Semi-strain towers	1 every mile	1 every mile
Suspension towers	6-1/3 per mile	9/4 per mile
Standard span	725 ft.	515 ft.

Specifications for Tower Design

Strain Tower—Design to hold all or any part of 6 conductors and 1 ground cable in straight line to 80% of maximum cable tension and also to maximum cable tension at a line deflection of 45°.

Semi-strain Tower—Design to support all or any part of 6 conductors and one ground cable as a suspension tower or at maximum line deflection of 10°. Also to hold unbalanced cable tension 15% of maximum cable tension at all supports or unbalanced tension of 80% of maximum at any two supports.

Suspension Tower—Design to support all or any part of 6 conductors and one ground cable in straight line. Also to hold unbalanced tension at 50% of maximum cable tension at any one support.

Tower Loads

	4/0 A.C.S.R.	2/0 Copper
Maximum span	1300 ft.	850 ft.
Ruling span on which design is based	1100 "	750 "

Suspension Tower

1.—Vertical at each of 6 conductor supports	1400 lbs.	1100 lbs.
(Including insulators and 2 men)		
Vertical at 1 ground cable support	1090 "	710 "
Total	9500 "	8300 "
2.—Transverse at each of 6 conductor supports	1350 "	805 "
Transverse at each of 1 ground cable supports	1190 "	780 "
Total	9290 "	5810 "
3.—Longitudinal at any 1 cable support	3000 "	1600 "
4.—Wind on tower, (13 lbs. per sq. ft. exposed area of one side.) $\times 1\frac{1}{2}$.		
5.—Weight of tower.		

NOTE: 1, 2, 3, 4, and 5 to act simultaneously.

Semi-strain Tower—for straight line or deflections up to 10°

1, 4 and 5.—same as suspension tower		
2.—Transverse at each of 6 conductor supports	2380 lbs.	1355 lbs.
Transverse at each of 1 ground cable support	2060 "	1040 "
Total	16,340 "	9170 "

NOTE: This equals 2 for suspension tower plus component of maximum cable tension added for a 10° line deflection.

3.—Longitudinal at each of any two conductor supports	4800 lbs.	2560 lbs.
Total	9600 "	5120 "

NOTE: 1, 2, 4 and 5 act simultaneously or 1, 3, 4 and 5.

Strain Tower—for straight line or deflections up to 40°

1, 2, 3, 4, and 5.—same as suspension tower.		
3.—Longitudinal at each of 6 conductor supports	4800 lbs.	2560 lbs.
Longitudinal at each 1 ground cable support	4000 "	2400 "
Total	32,800 "	17,760 "

NOTE: 1, 2, 3, 4, and 5 to act simultaneously.

Figure 6 illustrates the tower arrangement. The right half is for 4/0 A.C.S.R. and the left for 2/0 copper. The vertical spacing in each case is based upon a consideration of the relative sags with and without ice loads at 32 deg. Fahr. For the level country when the 4/0 A.C.S.R. maximum span is 725 ft. in stead of 1300 ft. the vertical separation between cross arms is reduced from 11 ft. 6 in. to 7 ft. which is the same separation as for 2/0 copper.

The following table gives the comparative weights of the several types of towers and the total weight of steel per mile for the several cases.

Weight of Tower Steel Including Steel Anchors

Type of tower	4/0 A.C.S.R.		2/0 Copper	
	Rough Profile	Level Profile	Rough Profile	Level Profile
Suspension	4,500 lbs.	4,000 lbs.	3,500 lbs.	3,200 lbs.
Semi strain	6,500 "	6,000 "	5,000 "	4,500 "
Strain	10,000 "	9,000 "	8,000 "	8,000 "
Total weight per mile	28,100 "	31,700 "	41,000 "	35,000 "

The advantages of A.C.S.R. are greater in rough country than in a level one, but the balance in first cost is apparent in both. The comparison does not extend beyond the tower steel, but the relative saving includes insulators and fittings and labor of erection.

The line of which the profile in Figures 4 and 5 is a part was single circuit and the supports are wood pole H frames. By assuming a double circuit line and steel towers

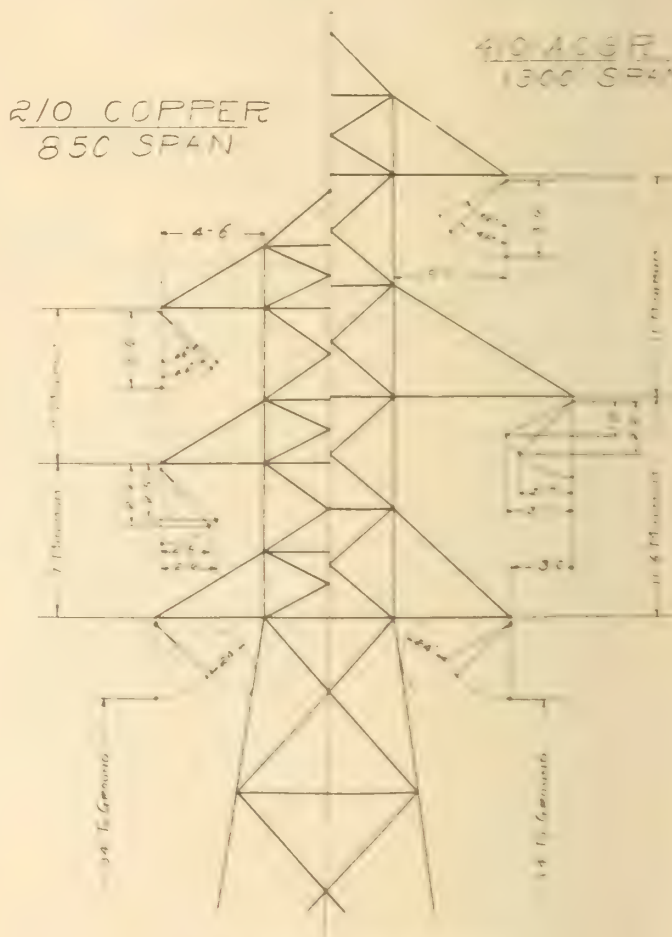


Fig. 6—Relative tower arrangement

the problem becomes a more typical one. The weights of the various towers and the total steel weights per mile are estimated from a large amount of available data and are conservative.

Credit is due Mr. Williams Hoopes of the Aluminum Company of America, for the first introduction on a commercial scale of aluminum cable steel reinforced. The writer also acknowledges the assistance of Mr. John B. Leeper of the American Bridge Co., in preparing data on the weights of steel towers and of Mr. Maxwell E. Noyes of the Aluminum Company of America in laying out templates and profiles.

Mr. T. J. McFadden who has been in the head offices of the Diamond State Fibre Company at Toronto for some months is now covering Western Ontario territory.

Grounding Appliances

Many Central Station Operators and Engineers Add to the Discussion

Recent issues of the Electrical News have urged the intensive study of the possibility of grounding household appliances so that fatalities from handling them might be definitely and permanently prevented. It does not appear to us that a campaign of education is sufficient. At the very start we shall run the chance of frightening people away from the use of electrical devices and, further than that, any amount of education will not reach very young children or absent-minded grown-ups. It does seem as if the responsibility rested with the electrical industry itself, to make the use of these appliances, as far as it possible, humanly speaking, fool proof.

Of the different suggestions offered in the past nothing seems to quite fill the bill except the permanent grounding of the frame of the appliance. If we could first settle this point we should have done something. The next step would seem to be to devise the best means of grounding. This apparently can only be done by means of a three prong plug, one point of which is connected to the frame. Just what this would involve in the way of a revolution of our wiring systems is not evident on the surface. We are glad to have a number of letters from prominent Canadian electrical men, some of which contain valuable suggestions, which we are pleased to pass along to our readers:

Make Appliances Safe and Foolproof

Walkerville, Ont.

Editor Electrical News:—

Your letter of Feb. 16th raises a question which we, as electrical men, should find extremely interesting at the present time. Experience has made it apparent that the average domestic consumer knows very little of the proper method of operating and handling domestic appliances. The necessity for the proper repair and maintenance of these appliances is appreciated by only a very small proportion of the consumers. Consequently we find a large number of appliances being used improperly and in a bad state of repair.

At the recent convention of the Association of Municipal Electrical Utilities the trend of opinion was apparently toward an educational campaign which would enlighten the consumers to such a degree that accidents would be prevented. To my mind this point can never be reached by this method, since it is impossible to carry on such a campaign and obtain entirely satisfactory results. A great deal can be accomplished by this educational method, but I believe that it should be carried on in conjunction with a campaign to safeguard all appliances by some method of grounding or similar protection. The two ideas should be co-ordinated and not only should the consumers be educated in the proper method of handling these appliances but the appliances should be protected in every way that protection can be given economically.

In the matter of education great care must be taken or the whole campaign would ultimately prove detrimental to the use of the appliances since a large number of people would obtain the idea that appliances were not safe. Therefore, I believe that the first step should be to make these appliances as safe and fool-proof as is economically possible, even should this involve a very radical change in the method of connection. We are then in a position to carry on an educational campaign among the consumers of electricity and the public generally which will be of great benefit to all concerned in the electrical industry.

I trust that I have satisfactorily outlined my views in

this matter and I should be very glad to see some steps taken along the lines indicated in this letter. If there is any further assistance I can render kindly call upon me at any time.

Yours sincerely,

Walkerville Hydro-electric System.

M. J. McHenry, Manager.

Rules Not Framed to Protect Life

Power Building, Montreal.

Editor Electrical News:—

I have your letter of the 15th inst., in reference to the fatality resulting in a woman's death in the bathroom by coming in contact with some of the bath fixtures and a small standard air heater.

The trouble, of course, is due to the fact that the rigid rules for electric wiring are framed to prevent fires and not to protect life, excepting that it is recommended that the secondary be grounded.

My work takes me all over this country and I often wonder how it is that more people are not killed in bathrooms or in other parts of the houses. I seldom stop at a small hotel but what I see wiring that could easily result in death in the bathrooms and in some instances in the bedrooms and halls.

I know of a house in Montreal where most of the switches in the house are immediately above a radiator. While a grown-up person might turn on the switch without touching the radiator at the same time, a child could not do so, and until some general law is made to cover this point and the law rigidly enforced by the lighting companies refusing to connect up to a house or to serve any one with electric service where such dangerous wiring exists, there will continue to be deaths by contact between electric fixtures, radiators, bathroom fixtures, etc.

A certain amount of protection is, of course, given by grounding the secondary, provided the grounding is made in a very thorough manner and so maintained.

Yours very truly,

R. S. Kelsch,

Consulting and Designing Engineer.

Impractical Multiplicity of Standardized Plugs

Collingwood, Ont.

Editor Electrical News:—

I have your letter of 16th inst., re "Grounding Appliances," and it appears to me that something more than a "campaign of education," as you mentioned in your letter is necessary where a life and death hazard is concerned. Personally I approve of grounding if the grounding is properly and effectively done. Apparently there is a difference of opinion regarding service wire grounding. Even the Electrical Inspection Department, which naturally should be a leader and master of this situation, is as far from reaching an effective remedy or decision as the rest of us. You give your opinion that a third wire should be installed to every outlet where appliances are used. That would simply mean using a third wire to every outlet, because electric irons, portable heaters, vacuum cleaners and other appliances are liable to be used on all outlets, if convenient, from the basement to the attic. So where are you going to draw the line? This would mean a third wire to every outlet, or the condemning of the present system to date. So far no practical solution on this matter has been reached. And no one appears to be an authority on it. You are also of the opinion that the installation of a third wire and a three terminal plug would involve an entire revolution in the present manufacture of plugs. To my mind that day cannot come too soon, because

the present impractical multiplicity of unstandardized plugs is a curse.

There are many difficult problems ahead of us, and one of these that should not be overlooked is the present and dangerous game of selling and buying and slipping into the innocent home the cheap, defective appliance, which has neither been approved of nor inspected. And another evil is the purchasing and installing of appliances in houses and overloading the circuits after the inspector has given the installation his O.K. And another still is the so-called repairing of appliances by the cheap self-styled electrician. We can name lots of defects, in fact they are numerous, but we are patiently, or rather impatiently, waiting to hear of a practical and commonsense remedy.

Yours very truly,

The Collingwood Public Utilities Commission,
Per E. J. Stapleton, Superintendent.

Educate the Householder

Woodstock, Ont., Feb. 21, 1921.

Editor Electrical News:—

Your letter of the 16th inst. received and noted.

In reply I would say that I am still of the opinion that a general system of education along electrical lines will do more to solve the danger to life than any scheme of grounded appliances, polarized plugs, etc., however good these may be.

I consider there is as much danger from worn extension cords as anything, for some people will persist in having long cords around the houses, office or shop and carry these into damp basements and around steam and water pipes, without any thought of danger.

A two pole polarized plug with the appliance frame grounded would only protect — as one of the engineers brought out at the recent convention—till such time as the cord got bad and an amateur attempted to repair it; if the connections were reversed in this process, the very condition would be brought about that the polarized plug is intended to prevent.

The three pole plug you suggest would overcome the difficulty mentioned above, as should a wrong connection be made the appliance would not work. It would not be necessary, however, to run three wires through the house, as the third contact in the receptacle would be connected to the wire which is already grounded. This, of course, would only apply where the neutral of a three wire or one side of a two wire secondary is grounded.

To sum up the matter, make all equipment as safe as possible and also educate the public regarding the handling of electric wires and appliances.

Yours truly,

Woodstock Water & Light System.

J. G. Archibald, Manager,

Concentric Wire Would Remove Hazard

Orillia, Ont., Feb. 21, 1921.

Editor Electrical News:—

Replying to your letter of the 16th inst., re discussions on "Grounding Appliances," I beg to say that while I feel that education with regard to this matter is first-class, yet I agree with you that something further is required in this connection. I think we should run a special colored wire which would be connected to the neutral outside and grounded at as many convenient points as possible inside the building. This would be satisfactory either for 2 wire or 3 wire services and this, I believe, is the method at present used in England.

Mr. Gover, our secretary, has also suggested that a concentric wire, the outer part of which is grounded, could be

suitably used and carried about anywhere, the line side of the wire being the core.

I think that with either of these suggestions adopted there would be no life hazard attached to the use of appliances either in the bath room or the laundry.

I am fully aware that this would be quite a change from the present system and it will have to be worked up gradually on all rewiring jobs.

Yours very truly,

Orillia Water, Light & Power Commission.

R. H. Starr, Engineer.

Steady Growth of Shawinigan Power

The annual meeting of the Shawinigan Water and Power Company, Limited, was held on February 15th. The report will encourage interest in public utility securities which has not been so much in evidence for some time past. It shows that the net revenue increased more than \$135,000 over the previous year, and that there has been a steady increase in the demand for electrical power notwithstanding disturbances in other lines of business.

One of the features of the statement is the marked change for the better in the relation between current assets and current liabilities, the net working capital having risen by \$1,361,529 during the year.

The report reviews the company's operations from the time of commencement of operations some 20 years ago to the present day, and continues as follows:—

"The electrical capacity of the company's power stations has risen to about 150,000 horse-power, which with the 70,000 horse-power now being taken under contract from the Laurentide Power Company, Limited, makes a total of 220,000 electrical horse-power flowing into your company's distributing system. In addition, the company has available hydraulic power, sold on the basis of water-power, of approximately 60,000 horse-power.

"The growth of the company's business is shown by the following figures: The load on the power stations was in 1905, 20,000 h.p.; 1910, 50,000 h.p.; 1915, 100,000 h.p.; 1920, 220,000 h.p. This shows a growth in fifteen years at an average rate of about 14,000 horse-power per year, while the growth for the past five years has been about 20,000 horse-power per year.

"As against this ratio there is under contract in the present year new business which will require the installation of 40,000 horse-power at Shawinigan Falls. These contracts when brought into operation will augment the company's gross revenue by more than a million dollars per annum. All of this power will come on the company's system during 1921 and early in 1922. This has also involved the duplication of the company's lines to Thetford Mines and Quebec, which has been completed, and also a second transmission line to Montreal, undertaken in the past summer season, will be completed during this year.

"The splendid financial basis upon which your company rests can be clearly shown by its strong asset position, there being about \$34,000,000 of fixed assets against only about \$13,000,000 of bonded indebtedness, including short term notes. The company's various reserves amount to over \$4,000,000, or approximately 20 per cent. of the entire outstanding common shares.

"The figures of output for 1920 of 1,140,759,076 kilowatt hours indicate the company's importance in the industry of the province. This operating position is paralleled only in one or two other industrial centres in North America. Niagara Falls, producing electrical energy for many years, and the cities of New York and Chicago, operating steam units on a large scale, are the only comparable industrial centres from the standpoint of the production of electrical energy.

The Electrical Contractor

A Standard Estimating Sheet

Two Forms Submitted for Criticism—Let Us Have a Canadian Standard—What do You Think of Them?

Recent issues of the Electrical News have mentioned the appointment of a Committee to prepare a Standard Estimating Sheet, which can be supplied at cost to all electrical contractors doing business in Canada. This committee has drawn up what appears to us a most comprehensive scheme. Admittedly it looks somewhat complicated for the small job, but at closer range we are convinced that it could be almost universally used. At our request Mr. Harry Rohleder, a member of this committee, who, with the other two members, has devoted a great deal of time to the preparation of these forms, has sent us the following explanatory letter. We urge every contractor in Canada to read and study these suggestions carefully and having done that to submit an opinion and offer suggestions for any improvements.

Toronto, Ont.

Editor Electrical News:

The committee appointed by the Ontario Association of Electrical Contractors and Dealers consisting of Mr. Gray of R. A. L. Gray & Co., chairman, Mr. Kay of Bennett & Wright, and Mr. Rohleder, of Harry Alexander, Limited, to prepare an "Estimating Sheet" which may be used as a Canadian Standard, have made a report and offer for discussion the forms herewith. (See two following pages). The Committee report that they believe these forms should answer the purpose for small as well as large contractors, as they can be used for either a knob and tube or conduit job. There are two forms which are designated Form A. and Form B. Form B. is not essential but must be used if the contractor wishes to check his work. Form A. designates various floors because in quite a few cases where you are figuring an office building, a theatre or hotel, there are times when the plans are revised or one or two floors omitted. In this case, it is very simple to find the exact quantities on these various floors without re-estimating the entire job.

To demonstrate how this sheet is used the writer has taken an ordinary residence and at first glance it may appear that this sheet is too large and too complicated. However, with this illustration we have practically used the entire sheet with the exception of two columns.

Form A

At the head of this sheet is all information that would be required, such as Sheet Number, Estimated By, Building, Estimate To, Architect, Engineer, Proposal Number, Scale, Estimate Due, Address, Date on Plans, Number on Plans. The blank space at the top of the sheet is left for "Reminders" which we will have printed in, in small type if this sheet meets the approval of the contractors.

Materials

We have taken off quantities for this residence, floor by floor. This gives a total of 19 ceiling outlets, 56 slide out-

lets, 10 single gang, 1, 2 gang and 1, 3 gang switch boxes, 2, 30a., 250v. fuses, 20 fuse plugs, 5 s.p. and six 3-way switches complete with plates and 2, 5 amp. snap switches, 4 plug receptacles, 3 lamp receptacles, 5 drop cords, one floor receptacle, 20 ft. of $\frac{3}{4}$ in. conduit, 1 s.b. concealed cutout, 1 $\frac{3}{4}$ in. L.B. and 1 $\frac{3}{4}$ in. F. condulets complete, 1 table clamp complete with cord and plug, 2500 ft. No. 14, 80 ft. No. 10 wire, 2, 6 drop annunciator, 2 bells, 10 push buttons, 13 lbs. No. 18 w.p. wire, 1 bell transformer, 1, 12x12x4 metal box, 5 3x2 wire plug cutouts, 1, 12x18x3 metal box, 700 split knobs, 800, 3 in. and 48 6 in. tubes, 500 ft. loom, 75 outlet boards, and 1, 30a., 3p., 250v. Square D. box.

We next multiply these quantities by our unit cost. Outlet boxes, switches, etc., are figured per unit, conduit and wire are figured by 100 ft. After multiplying these quantities by the various unit costs we get a material cost of \$185.33.

Labor Cost

Now, in order to get our labor cost we bring down our total quantities of material and simply multiply by the unit labor cost. In this case, we get \$89.91 labor for installing the above materials.

Materials

There is a certain amount of incidental expense in connection with any class of job, so we have instituted an expense column where we have included locknuts, bushings, pipe straps, asbestos, permit, carfare, tape, etc., screws, bell staples and meter board, making a total of \$20.50 expense.

Summary

We then fill in our summary as follows:

Material	\$185.33
Labor	89.91
Expense	20.50
Net cost	295.74
20% overhead expense	59.15
Gross	354.89
10% profit	35.49
	\$390.38

The price we quoted to our customer was \$391.00.

Remarks

Under "Remarks" we have explained that this residence consists of 3 storeys and basement; service to enter south-east corner of basement; cutouts 3 feet from service. These remarks, we find, avoid a lot of confusion when we are awarded the contract as in most cases the estimator will figure bringing service into building as directed by the architect or engineer and when the foreman starts the job he would probably get instructions to bring service into some other portion of the basement which might increase the cost. In this case, he has exact data to work to.

Form B

We also enclose a "Materials Ordered" form which we have found very satisfactory in checking the job while it is in progress. There are a few smaller contractors who have no way of checking their job while it is under construction or even when same is finished. You will note this sheet has all information that we think would be necessary—Job

Form A—Estimate Sheet

THE ONTARIO ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS												
SHEET NUMBER 1		ESTIMATED BY K.B.		BUILDING Rev for A.W. Sullivan		ESTIMATE TO "New"		ARCHITECT J. Storer				
DATE		ESTIMATE DUE Dec. 4-1920		ADDRESS Rosedale Rd. Toronto		DATE ON PLANS Nov 2, 1920.		NO ON PLANS A-1-2-3-4				
TORONTO		DISTRICT		REMEMBERS								
FLOOR	HEIGHT	CEILING OUTLETS	SIDE OUTLETS	SWITCH BOXES	SWITCHES	BASE RECEPIS	LAMP RECEPIS	DROP CORDS	FLOOR RECEPIS	CONDUIT	WIRE	REMARKS
BASMENT	7'6"	7	1	2	3	3	5	1	20	1	2	1
1ST FL	9'2"	7	26	3	3	2	1	1	1100	1	4	9
2ND FL	9'2"	4	26	1	2	2			960		1	2
3RD FL	8'0"	1	3	7					190			
4TH FL												
5TH FL												
6TH FL												
7TH FL												
8TH FL												
9TH FL												
10TH FL												
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5	1	20	13
LABOR		19	56	10	1	2	4	3	5	1	20	13
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5	1	20	13
LABOR		19	56	10	1	2	4	3	5	1	20	13
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5	1	20	13
LABOR		19	56	10	1	2	4	3	5	1	20	13
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5	1	20	13
LABOR		19	56	10	1	2	4	3	5	1	20	13
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5	1	20	13
LABOR		19	56	10	1	2	4	3	5	1	20	13
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5	1	20	13
LABOR		19	56	10	1	2	4	3	5	1	20	13
TOTAL		19	56	10	1	2	4	3	5	1	20	13
UNIT COST		—	20	40	10	10	20	10	10	10	10	10
MATERIAL COST		19	56	10	1	2	4	3	5</			

Form B-Checking Sheet

[illegible]

Number, Building, Address, Date started, and Date finished. This form is turned over to the job foreman. Materials are then ordered. As the foreman receives slips from the various jobbers and supply houses he enters the material received in their respective columns. If the contractor keeps a stock of his own he uses a stock requisition form, copy of which is sent along with the goods to the job foreman, who enters same from this slip to this "Materials Ordered" form. When the job is completed these columns are added up and compared with estimating sheet. This will let the contractor know whether he is saving or has gone over his estimate on this job.

We have also allowed a space for unit cost and total cost in case a contractor wanted to find out the actual dollars and cents he has saved or lost by the transaction. A check on labor can also be had during the construction of the job, or at the finish, by simply multiplying material installed to date by unit labor costs, thereby letting contractor know whether he is falling back or is ahead of his estimated labor.

We would be pleased to hear any comments on the above sheet as the committee are anxious to get a standard estimating sheet that would meet the average contractors' requirements, but do not wish to do anything however, until we have this matter settled.

Yours very truly,
H. Rohleder.

Final Decision at April Meeting

Mr. E. A. Drury, chairman of the Toronto Section of the Association of Electrical Contractors and Dealers of Ontario advises us that the programme at their regular monthly meeting which will be held on March 3, will consist of a brief explanation by Mr. Rohleder of the Standard Sheets which have been recommended for adoption by the committee recently appointed and which we reproduce, with a brief explanation, in this issue. The matter will then be left over until the regular meeting in April, and in the meantime contractor members of the association are asked to study the forms carefully and either come prepared to discuss these or send their suggestions and criticisms, in writing, before hand.

Cleaning Up The Out-of-Date Wiring Jobs While Contractors Have Spare Time

In the February 15th issue of the Electrical News we ran a little item under the heading, "Inspectors Can Help." In this item we hinted at the fact that conditions in many homes, factories and warehouses are not just what they should be, and that the present time, when many contractors are not working at capacity, would be an opportune one for inspectors to bring a little extra pressure to bear on the owners of these buildings.

One of our correspondents has written us a very interesting letter which, if published without any explanation, might lead our readers to suppose that the inspectors in Toronto are not actively engaged in watching the interests of the electrical industry. We should not like such an impression to go abroad, as we believe in the main that the inspectors are not to blame for any unsatisfactory conditions which may exist to-day. They are doing excellent work, and where the wiring is open to criticism—as undoubtedly it is, just as our correspondent says—we believe it is not due to any indifference on the part of the inspectors. The fact seems to be that in this as in all other reforms it is necessary to move somewhat slowly, and sometimes for the sake of peace and quietness—and politics—it is necessary to go slower than one would like. Our thought was simply that a little more pres-

sure than usual might be brought to bear even at the expense of offending some factory owner, because, after all, when the job is finished, he would forget his grouch in the better, safer service he would receive.

Among other things, this letter helps to emphasize the necessity for greater pressure on the part of the inspectors and a freer hand in administering the law. We have pleasure in reproducing it in full:—

165 Symington Avenue,
Toronto, Ont.

Editor Electrical News:—

In your issue of February 15th, on page 48, there appears an item under the heading, "Inspectors Can Help." Permit me to say that the hint to the inspectors is timely indeed, but the trouble is that it takes more than a hint to put a little pep into some people. A baseball bat would do more good. Nobody will deny that undesirable conditions exist in Toronto to-day so far as lighting and power installations are concerned. Now the question is, what are the reasons for these conditions? Briefly, a lackadaisical enforcement of the rules and regulations of the Hydro-electric Power Commission. Looking in the dictionary I find the word "enforce" defined as follows: "to put into execution with vigor, compel, make clear or intelligible." Is this being done to-day? Certainly not! Possibly the present staff of inspectors, numerically, is not sufficient to make a systematic inspection of the present installations. If such is the case there is no reason why the present staff could not be increased temporarily and good results obtained. Aside from all this, my chief complaint is that the inspection department has apparently no means of preventing unauthorized persons from adding to or making changes to present installation without first taking out a permit to do so. To make my meaning more clear—any Tom, Dick or Harry can blow into town, go to a supply house, buy electrical supplies, tell the world he is an electrician, do a lot of botch work, and nobody is any wiser—especially the inspection department.

Again, often the owner of a property figures he is competent to make any repairs or changes. Perhaps he is. However, on one occasion I was sent to a certain address in the west end of the city to take down some fixtures. Going into the basement to open the main line switch I found a length of about 30 feet of telephone wire connected to a ceiling rosette. The wire was then laid across the furnace pipes, passed through a hole bored in the parlor floor, and connected to two mantle fixtures. I could relate other cases from my own experiences, and I am satisfied others could do the same. This kind of thing is being done right along. Cannot something be done to stop such practices, for there is no doubt whatever that work of this kind create both a life and fire hazard?

Respectfully,

Chas. F. Hendry

Voices Approval of Service Sheet

Bramford, February 18, 1931

Editor Electrical News:

We were very glad to see Mr. Roach's letter in your issue of February 1st, and note that there are others in the trade who are figuring contracts from retail basis as given in the Henderson Service. We have used this method for three years and it has many advantages over the old plan of cost plus overhead, plus profit. In fact we have actually found it a great help in proving contracts during the years we have been using it.

For example—We give a prospect a price of say \$100.00 for a wiring job. Having no knowledge of the cost of electrical material this price seems high to him, and he immediately wonders how we arrive at this price. Under the old

cost-plus method the best we could do was to give him a list of the material and time. Of course, we could show him our cost and the percentage added, but this is not sound business and it usually starts an argument.

Under this "Retail Price" method as advocated by the Henderson Business Service, Ltd., we can show our prospect an exact list of material and the price each article represents. Then from the total we take "off" 10 per cent. (if over \$100.00) instead of "adding" on a percentage.

Charges for work or figuring jobs on this retail basis does not give, as many imagine, a big profit, but as a rule will figure out about 8 per cent. to 10 per cent. profit after allowing for overhead expense.

Any contractor can check this up by figuring up an actual typical job, at cost in one column and retail prices in the others, and comparing them. If his overhead figured on his sales is 20 per cent., he will not make more than 10 per cent. clear.

Yours respectfully,
T. A. Cowan.

Electrical Co-operative Association, Province of Quebec

Very satisfactory results have been achieved by the Electrical Co-operative Association, province of Quebec, in its efforts to secure closer co-operation between the various electrical interests in the province. Its formation now comprises the important Public Utilities Commissions such as the Montreal Tramways Company, the Montreal Light, Heat & Power Co., the Public Service Corporation, the Bell Telephone Company, as well as the electrical manufacturers, contractors and dealers. The various interests are made up of separate groups, which function along lines affecting their individual interests, as branches of the Electrical Co-operative Association, the Advisory Council of which is made up of members of the various branches.

The aims of the association are far-reaching, the object being to develop and improve the service of the electrical industry to the public, which will be encouraged by a suitable educative and instructional campaign to make more use of electricity. With a view to obtaining these results, the practice of sound ethical business will be essential. Endeavor will be made to obtain fair treatment for invested capi-

tal, and bring about a fair attitude on the part of the public towards the electrical industry.

At the joint meetings recently held and which were attended by the representatives of the various groups, discussions took place on the various problems affecting their relations, with the object of eliminating such differences as heretofore existed and which prevented a close understanding. The jobbers' and contractor-dealers' sections have begun these preliminary discussions in a very satisfactory way, difficulties being discussed in a very frank and friendly manner.

Various other matters have been taken up, of interest to both the public and the electrical interests, in matters affecting new construction, and it is hoped to obtain noticeable results within a very short time.

Meeting in Quebec

An important delegation of the Electrical Co-operative Association, Province of Quebec, attended a series of conferences in Quebec during the week of Feb. 14th, when the electrical interests of Quebec and vicinity met for the purpose of the organization in that city of a section of the association. The meetings were held at the Chateau Frontenac, where the aims and objects of the association were exposed to representatives of the central stations, telephone and railway companies, jobbers, contractor-dealers, and engineers.

The delegation was in charge of Messrs. K. B. Thornton, president; M. K. Pike, J. W. Pilcher, N. Simoneau, vice-presidents; J. N. Mochon, manager-secretary; and included about twenty members from Montreal. The delegation was very cordially received at Quebec and left with the assurance of the hearty co-operation of Quebec City interests in the application of the association's principles.

The Crown Electric Company, 13 Pitt Street West, Windsor, has been awarded the contract for electrical work on \$5,000 alterations to building at that address for the Molsons Bank of Canada.

Mr. C. P. Poapst has recently opened an electric shop at 704 Somerset Street, Ottawa, where he will carry a complete line of electrical supplies. He will also accept electrical repair work.



Mr. M. K. Pike, Sales Manager Northern Electric



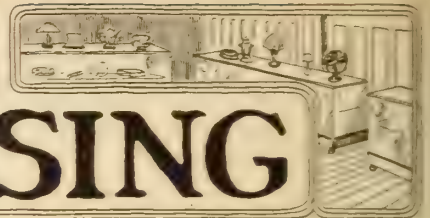
Mr. K. B. Thornton, Manager Public Service Corporation.



Mr. J. N. Mochon, Manager-Secretary Elec. Co-operative Association.



BETTER MERCHANDISING



A Slogan that Finds Favor Many Dealers Express Approval of Electric Goods Being Sold by Electric Stores Only

Québec, Feb. 21, 1921.

Editor Electrical News:—

In reply to your inquiry of Feb. 16, 1921, electric merchandising should be done through the proper channels, that is to say, sold by people who can give the service and who can look after the customers in case of trouble. In no case should electric material be sold by hardware, dry goods or drug stores.

Hoping this view will be added to your list, we remain,

The Quebec Electric Co.

R. H. Doddridge, Mgr.

* * *

Sherbrooke, Que., Feb. 21st, 1921.

Editor Electrical News:—

Your letter to hand, re "Buy Electric Goods in an Electrical Store." This is certainly a move in the right direction. Any other course not only hurts the dealer but the manufacturers as well.

When the price of wire was \$15.50 per 1,000 feet at the jobber's, a hardware firm here offered the same make of wire to us for \$14.00, due to their buying larger quantities than we could from the jobbers. Again, during last summer, lamps were very hard to get, and yet grocery stores, candy merchants, etc., all over town were agents for lamps. The result was, no one had a complete stock to offer.

Hoping to see more on this important subject in the Electrical News.

We are, yours very truly,

Wright Bros. & Co.

Per H. S. Wright.

* * *

46 Queen St. E., Toronto.

Editor, Electrical News:

Regarding your recent campaign re merchandising electrical goods through electrical stores only, we beg to say that the electrical store is the correct place where all kinds of electrical goods should be sold, as we depend only on the sale of these goods to pay overhead expenses, while if the hardware stores and departmental stores handle them as a side line they take away that amount of profit which rightly belongs to us. Besides they do not depend on the sale of electrical goods to meet overhead charges, as they have all kinds of hardware to sell and the departmental stores have a full line of other goods to sell. I say, each man to his own line of business. A hardware merchant sells a flashlight bulb marked 3.8 for a battery which requires a 2.9; naturally the battery will not give the right light, and the 3.8 bulb uses up the battery in half the time.

Drug stores, grocery stores, jewelry stores, etc., have no right whatever to sell electrical goods, as they have a full line of their own goods to make their money on.

Keep the good work up and my motto will always be—

Buy electrical goods in an electrical store and get satisfaction.

Any help I can give you or any other information I will gladly give on such a good point.

Yours truly,

Bright Light Electric Company

L. E. Flewelling, Manager

* * *

Toronto, February 21st, 1921.

Editor, Electrical News:

The opinion expressed in your issue of February 15th is to the point. The writer wants electrical goods sold in electrical stores only.

The following stores are now selling electrical goods. Music, sporting goods, plumbers, hardware, garages, grocers, furniture and departmental.

The manufacturer, his agents and jobbers and all of us are interested in selling electrical goods. As conditions are to-day, the manufacturer, his agents and jobbers see, and look for, only one thing; that is, an outlet for their goods to-day. The dealer, whether he be electrical or otherwise, also looks for a profit at the present time.

The electrical contractor-dealer is, no doubt, doing more for the electrical industry than any of the other stores selling electrical goods. Therefore, he should be given better terms than the others. For example: the whole display of the electrical store shows what electricity can do. The customer sees an array of irons, toasters, percolators, sewing machines, vacuum cleaners and clothes washers, which suggests a still further use of electricity. Let our customer visit the hardware dealer: "Yes, we have electric irons, but gas will heat your iron; we have them as well as the old sad iron." "Toaster, yes this is a good toaster, but here is an improved gas one, and it is cheaper." The customer also sees brooms, carpet sweepers, water power washers, in fact everything in opposition to the twentieth century idea "Do it Electrically."

The electrical trade should be organized; the manufacturer, jobber, central station, contractor-dealer and your trade paper each having recognition from the other, and giving support needed to each other.

Therefore, I would suggest that we make ourselves worthy of this acknowledgement by:

(1) Making our stores distinctly electrical, having them clean, bright, distinctive and well lighted.

(2) Organizing with all other contractor-dealers, meeting the other parts of the industry to arrange a fair deal to us all.

(3) Arranging with each other to advertise ourselves as the authorities on goods electrical.

(4) Attending meetings on receipt of notice; that all our energies may be concentrated on putting this thing over, and when an evil arises, letting organized action be taken to remedy it; giving suggestions, as well as help, to those appointed to act for us.

In conclusion, will say that the "Electrical News" must be thanked for starting this discussion; but remember, Talk

or Writing alone will not do the job, but Talk, Writing and Organization will; so come along to the next meeting on this invitation, and we shall do all three.

Yours very truly,

E. A. Drury.

The Right Idea

A number of enterprising electrical dealers on Danforth Avenue, Toronto, recently got together and inserted the advertisement shown below in a newspaper distributed locally. Without a doubt this is the right idea. The electrical industry is not sufficiently well established or remunerative yet that

Electricity is CHEAP and PLENTIFUL

See Electrical Stores' Assortments of
--Electric Clothes Washers, Vacuum
Sweepers, Heaters, Irons, Toasters,
Coffee Percolators.

The Electrical Man Knows Your ELECTRICAL NEEDS,
And is Here to Give You ELECTRICAL SERVICE.

Buy Your
Lamps, Appliances and Fixtures
From These Men Who Know

The Bishop Electric Co., 745
Broadview Ave.
Couling, H. A., 371 Danforth Ave.
Danforth Electric Co., 1566 Dan-
forth Ave.
Drury, E. A., 161 Danforth Ave.
Irwin F. Berkeley, 284 Danforth
Ave.
K. C. Electric Co., 1292 Danforth
Ave.
McLeod, Norman, 808 Danforth
Ave.

10% Discount

This coupon, if pre-
sented before Feb. 25,
1921, at any of these
Electrical Stores, en-
titles you to discount
of 10% this week on-
ly.

the average retailer can afford to take sufficient advertising space to attract attention, but an announcement like the one herewith, which was about 9 inches square, is easily borne by a number of dealers clubbing together, and is large enough to attract the attention of the reader.

In their next advertisement we only suggest that they display prominently "Buy Electric Goods in an Electric Store."

Backing the Public Utilities

Realizing the difficult position of public utilities in general to-day and the dependance of the contractor-dealer upon the success and development of these utilities, the National Association of Electrical Contractors and Dealers, at its recent annual meeting in New York, adopted the following resolution:

"Whereas the executive committee of the National Association of Electrical Contractors and Dealers recognizes the present need of public utilities in general, and electric light and power companies in particular, to further their sale of securities to the public, be it hereby resolved, that this committee shall offer its moral and active support in promoting the feeling of good will toward said interests and urge the membership of the organization which it represents to do all in its power toward that end."

Outlet Boxes Must Be Installed on All Knob and Tube Outlets

Mr. A. G. Hall, chief electrical inspector of the Hydro-electric Power Commission of Ontario, has announced that on and after June 1, 1921, approved outlet boxes must be installed at all outlets in concealed knob and tube work, as required in paragraph 8, section "B," rule "e," page 68, of the 6th edition of the rules and regulations. This is a rule that has not been enforced in the past by the Commission chiefly on account of the scarcity of steel. However, plenty of steel is now available and samples of boxes have been submitted by different manufacturers, which will not only add to the safety of the installation, but will simplify it, as all outlet boxes will be provided with a suitable fixture stud to which the fixture can be readily and securely attached.

It seems to be conceded by contractors that the enforcement of this regulation will not add to the cost of installation, as the different types of boxes submitted will cost but a few cents, and can be installed in so much less time than the angle bars now used that the net result will be a saving.

We understand the rule will not be enforced with regard to old houses which are already wired, nor will it be necessary to install outlet boxes on the verandahs or at basement outlets to new houses unless the ceilings are to be lathed and plastered.

Wanted—Salesmen!

A summary of the electrical needs of more than two hundred and fifty Canadian towns and cities distributed from coast to coast indicates only 7.3 per cent. saturation on the average. These figures are startling in the definiteness with which they point to vast sales opportunities. Here are the figures:

Houses wired—74.9 per cent.

Degree of saturation of wired homes:

Electric Ranges—3.1%
Elec. Percolators—3.7%
Elec. Vacuum Cleaners—5.0%
Elec. Washing Machines—5.9%
Elec. Dishwashers—.07%
Elec. Water Heaters—1.3%
Elec. Toasters—18.2%
Elec. Air Heaters—4.8%
Sewing Machine Motors—1.2%
Elec. Irons—45.7%
Elec. Ironing Machines—1.4%
Elec. Refrigerators—.06%
Elec. Fans—5.4%

Sand

The big steam locomotive can't always get a grip

On the slender iron pavements, 'cause the wheels are apt to slip.

So when they reach a slippery spot these tactics they command:

To get a grip upon the rails they sprinkle them with sand.

It's about this way in travelling along life's slippery track
If your load is rather heavy and you're always slipping back.
Then if this common practice you completely understand,
You'll provide yourself in starting with a good supply of sand.

You can reach most any station that's on life's schedule seen
If there's fire beneath the boiler of ambition's strong machine;
And you'll reach a place called Flushtown at a rate of speed
that's grand

If for all the slippery places you've a good supply of SAND.

—Exchange

Handling Lighting Fixtures

Possible to Make Good Profits—Know Your Business and Give Service*

As an example of one who has made a success in this business, and his method of conducting it, I am going to pick out a man who went into the business five and a half years ago with a partner who put up \$10,000. This partner was in the cloak business at the time, and he tired of this business at the end of about a year and a half. He sold out to this man for \$10,000, the interest that he had paid that amount for, and at the present time this fixture dealer doesn't owe anything on that account. He has made all the money he has out of it and I might say that he has bought a home, his wife drives an automobile, he also drives one, and he makes money every year.

I am not going to take as an example his business in the last two years, because the last two years have been very good years, and almost anybody with business ingenuity could make money. I want to take the year 1918 and tell you of this man's experience in that year. With \$10,000 capital, and a business of approximately \$35,000, he told that in 1918 he made \$7,500 net, after paying himself \$50 a week and paying the expenses of conducting his business.

A \$35,000 fixture business is the average amount that most contractors who go into that business are interested in, but this man is only in the fixture business; he is not in the contracting business, nor in the merchandising business. Any contractor can do this if he runs his fixture department separately. This man manages his business himself and is the salesman. He meets his customers and in most cases sells his goods.

He has a man about forty-five years of age in his office, who sells to customers who come in when the proprietor is not in. When the proprietor is present this man takes care of the books and the telephone, occasionally unpacks the glass, possibly packs up an order, and keeps the fixtures in shape. A man of that sort receiving \$45 a week is in a pleasant occupation. He is not a young fellow in his prime, of course, but I have found that if you get a man of that age in your display room, customers like to be waited on by him, and in this particular case this man waits on about a third of the customers in that store. In addition to that, this proprietor has two journeymen in this employ. Four men in this entire force, and the four of them did that \$35,000 worth of business in 1918.

Making Profitable Connections

He originally had business entirely from carpenter contractors. When he first started there was plenty of that kind of business, but as things changed he found that he ought to have some connection with people who were wiring old houses, and he made a connection with an electrical contractor who doesn't do fixture business. If the fixture dealer gets any wiring business, he sends it to that contractor. The fixture dealer pays to the wiring contractor twenty per cent. of the gross amount of the sale, and the wiring contractor carries the account. I just state that as showing the one discount, or one percentage that he pays.

In addition to that, this man has one other discount from his list price on fixtures, which is ten per cent. That goes to the carpenter contractor who is a customer of his. That ten per cent. is for the assistance the contractor gives him in getting a customer and picking out the fixtures for him.

*J. L. Wolf before Baltimore Convention N.E.C.A.

This particular man is up against all kinds of competition. He is in a very desirable location. Once in a while he takes a commercial job, and when he does that he goes out to dealers who handle that sort of thing, and buys the stuff with which to finish the job. That is, he doesn't carry samples of the commercial stuff. His particular line concentrates on residential goods, and I guess that is the bulk of the business that most of us do.

Method of Pricing

It may be surprising to you to know this man's method of pricing his fixtures. He takes the cost price of the fixtures that he buys from the manufacturer and he adds to it the sockets, the wire, the labor, what it costs him to assemble it, and what it costs to handle it, and to that total of the cost he adds 166 per cent. That seems an awful lot, but when you take into consideration some of those sales that he makes for some of these old houses, and pays that twenty per cent., you see it doesn't leave so much after all. But he does the business, and it shows that a man by handling his business properly, can get a good market and can please his customers.

One fine thing about this man is the service to his customers that he gives them by a unique arrangement that he has adopted. Take a situation that to-day he has no fixtures to install, but he has orders that were sold yesterday. Those orders are immediately assembled and packed up, and he carries on hand an average of \$5,000 worth of orders, com-

Let us neither think nor talk depression. Last year was one of the best—many firms say the best—in the history of the industry. If the electrical field were saturated the outlook would be different. But it is only 7.3 per cent. saturated.

plete, ready for the customer. This amount he has borrowed from the bank, and is at the present time paying seven per cent. for it. I think the cost to him is about \$300 a year, so as to have on hand his customer's order when the customer wants it.

His capital is not invested in that particular end of it. His capital is invested in the other end of his business—in other words, for \$300 a year he can always have the fixtures ready to send out on a moment's notice, and that particular feature of handling orders does two things—it gives him an opportunity to keep his men busy uniformly. When they are not out hanging fixtures they are in the shop assembling fixtures. The second help is that when he finds something short when he is assembling fixtures, he has ample opportunity to get those things from the factory or from the jobber in time to put them in before the order is delivered. In that manner he sends the order out complete and hangs it complete, and makes a minimum of trips.

The man who hangs the fixtures has a part of his own, and in that machine he has various things—sockets, wire, and so on. This allows him to complete the job at the time that he goes out, and in ninety per cent. of the times he does that. Selling the jobs that he does, and being on the job and meeting his customers, he has an opportunity to get the installation right the first time.

On the Job Himself

He also tries to be in the neighborhood where his man is hanging his fixtures the day they are being hung. If there are any bills to collect in that neighborhood he makes it convenient to go out and collect them on that day. If there are any repairs to make on any job, or if a man says

that this or that is wrong when he goes to collect the bill, he gets the man who is out in that neighborhood and takes him over at a very small cost and does that work.

Another feature of this man's business, which I think is very good, is the point that he assembles very little. Most of the stuff that he gets in is all complete, ready to install, excepting the fact that it must be wired, and sockets put on.

Knows His Costs

Another feature that gives this man ample time to do the things that he does, is the schedule of cost that he keeps, and which he uses in marking up all fixtures. Take a candle fixture, for example—two or three, or five lights—and he has decided on the schedule that it will cost to put sockets and wires in that fixture and hang it—two lights so much, three lights so much—not so much a socket, but so much on the candle fixture on the particular job.

When he gets a fixture and the shop assembles that fixture, this man in his store can mark up the price on that fixture by referring back to the schedule, without going to the boss about it. He simply takes the schedule and affixes the price to the fixture. Then he marks up the hundred and sixty-six per cent., or whatever it may be. There are often things, taking into consideration the glassware, and so on, that have a mark up of two hundred per cent. So he marks those up, and he is not afraid to get a decent profit out of all his fixtures.

Works for Organization

This man is quite an ardent association worker, and even with all these features in his business, which take so much of his time, he devotes about four hours a week to association work in the city where he is located. By devoting that much time, and getting the rest of the dealers in that particular town to think the way he is thinking, and showing them by example, what he has done, he has helped to bring the fixture business up to a higher standard, so that his competitors can make money and also bring him nearer to their prices.

He discounts all his bills, and that, too, makes a fair profit for him. There is one other feature that comes to my mind, and that is in the marking of his glass he takes the cost of it at the factory and adds twenty per cent. to all glass. That is the minimum amount he adds to take care of barrelage, package, freight, and breakage. He takes his invoices and immediately adds twenty per cent. to them, and then he adds his hundred and sixty-six per cent. to that. That is his method of arriving at the glass selling price.

He marks his glass and fixtures separate, and then is able to change glassware from one fixture to another, to suit his customer.

To do this he has two display rooms, approximately twelve by twelve feet, and one room, I would say, about nine feet square, with a nine foot six ceiling, and has approximately a hundred samples.

A loss of \$390,000 has been sustained by the Manitoba Government Telephone Commission for the fiscal year 1920 in operating the system, according to H. E. Brockwell, acting Telephone Commissioner. This is said to be the heaviest loss since the Government took over the system of the province. The cause of the deficit is claimed to be in the changing from the manual to the automatic system. The Government will ask the Public Utilities Commissioner for permission to increase the rates from 10 to 15 per cent. above the present schedule, in order to put the telephone system on a paying basis.

The City of Winnipeg Hydro Appliance Department Sales Record for 1920 Far in Excess of Previous Years

The Appliance Department of the city of Winnipeg Hydro-electric System (formerly City Light and Power Department) may well be proud of its sales record during the last five years:

1916	\$ 7,832.41
1917	27,930.30
1918	60,262.76
1919	98,742.22
1920	304,370.90

Mr. J. Swan, who is manager of the Appliance Department, was from 1910 till 1916 on the sales staff of the Winnipeg Electric Railway Company. During the latter year he linked up with the Winnipeg Hydro as appliance salesman.



Mr. J. Swan, manager Winnipeg Hydro
Appliance Sales

At that time one man could easily take care of the sales and had ample time and opportunity to develop prospects and expand the business. The sales staff now numbers 19.

The first electric range sold by the Winnipeg Hydro was installed in July, 1916, eight ranges being sold to the end of December. During 1920, 1,073 ranges were sold by the department.

Central stations recognize in the range a heavy load builder, different from any other domestic or commercial current consumer, a load which demands the gradual rearrangement of the lines, based on future requirements for several years.

A complete line of labor-saving electrical devices is displayed to advantage in the Hydro's spacious showrooms at 55-59 Princess Street.

During the last twelve months 341 washing machines, 318 water heaters and 284 suction sweepers, besides hundreds of irons, toasters, percolators, hot plates, air heaters, etc., were disposed of. Still, the Winnipeg Hydro officials feel that the fringe of the electrical industry has been but touched and the possibilities for the future are wonderful.



Appliance Department of the City of Winnipeg Shows Wonderful Development

During past five years sales total has increased from about eight thousand dollars to over three hundred thousand dollars. Still feel that business has just been scratched. Publicity and service basis of operation.

Photos herewith show interior and exterior views of Winnipeg City Hydro store.



electrical development measures the development of civilization.

Regular educational advertising is carried on continuously and with much success under the direction of Mr. W. T. King, publicity manager. Another important contributing factor in the success of the Hydro's electrical merchandising is the 100 per cent. satisfactory maintenance service—in quickly making repairs which may be necessary. Mr. J. R. Aikman superintends the service repairs department. Co-operation with the electrical contractor-dealers in the city in selling standard goods at standard prices has also done much to stimulate the electrical industry. There is without question a mutual dependence between the contractor-dealer and the central station. Encouragement by the central station of the contractor-dealer's business is a direct feeder to central station revenue. Co-operation and a right attitude are powerful influences in building up trade, and the Winnipeg Hydro's appliance department is setting a pace and showing what can be done in the way of sales.

Capitalizing the Weak Points of the Mail Order Business

The Electrical Dealer Can Give Quicker and Better Service—Tell the Public About It*

I worked in a mail order house for nearly two years and during that time had an excellent opportunity to investigate their methods and find out just what the advantages and disadvantages of mail order buying were.

I must admit that there are many advantages, but there are also many disadvantages. Naturally the electrical dealer should make every possible use of the failings of the mail order house. But does he? I have seldom seen a sign in a window explaining why it would be better to buy in that particular store than to send for electrical appliances by mail.

The mail order concerns do not hesitate to tell the customer why it is better to buy by mail. They send out elaborate literature calling attention to all their good points and all the bad points of the electrical dealer. Why doesn't the electrical dealer do the same? Why does he always dwell on the one big fault of the mail order concern, that of your having to buy goods without first seeing them, when there are a goodly number of smaller faults?

The Little Things Irritate

It is the small item that irritates a customer. I have seen letter after letter complaining about the use of vouchers and stamps.

When a customer sends in an order to a mail order concern and the concern fails to send back the entire order, then arises the problem of refunding money to the customer. Shall it be stamps, or a voucher to be applied in a future order? Perhaps the firm sends a check. The customer has no bank account, so cannot easily cash the check; so sends it back and asks for stamps. Now no mail order clerk wants to count out several dollars' worth of stamps, so sometimes the customer, after a good deal of time lost, receives a voucher to be applied to his next order.

In the meantime, the customer has grown very angry and vows never to buy from that house again. He sends back the voucher. Weeks and maybe months go by before he gets his money in the form he wants it. He would now be just ripe for an appropriate window card something like the following:

Why bother with a mail order house? Although they refund money when goods are out of stock or

returned, don't you always have trouble in getting your money in the form you want it? Don't you get a voucher when you want a check, or stamps when you want a money order? Buy here and save all that time and money wasted in writing letters.

I have a vivid remembrance of a certain spring when I had planned on giving an electric iron to my sister for her birthday. I had a ridiculous idea that by buying from a mail order house I could get it cheaper. As far as actual dollars and cents goes my electric iron was perhaps a little cheaper than if I had gone to town and bought it. But the agonies I suffered wondering whether it would arrive in time for the birthday took all the joy away from the giving. In a way I always blamed my favorite shop for not having a card similar to the following in their window:

Why worry and fret for fear your electrical appliances will arrive too late? We have all the latest styles, the best merchandise and a large stock to select from. Why send for your electrical appliances from a mail order house to save a few cents—perhaps—and get gray hairs because of worry? Isn't a mythical nickel or dime too much to pay for gray hair?

I worked in the refund department and had occasion to read many complaining letters. One letter in particular stands out in my mind. It was from a man who wanted an electric heater for his office. He waited and waited and wrote many a letter. We were short of clerks at the time, so his letter had to wait. Finally he wrote in disgust and said to send an electric fan instead of the heater, as he would have more use for a fan in summer. He insinuated, of course, that he would not get his heater until the summer months came.

This man was from a small town. Why didn't he buy from the local electrical dealer? He must have had some

Keep this card constantly before the eyes of the public.

BUY
ELECTRIC
GOODS
AT AN
ELECTRIC
STORE

seemingly good reason for sending to a mail order house, but couldn't the electrical dealer have overcome these reasons by a few window cards?

Why buy electrical appliances from mail order houses? We have every make and style, and what is more, we make deliveries at once. There will be no waiting for an order if you buy from us.

Many housewives like to lift different electric irons before buying in order to find out the weight. Why don't the electric dealers play this up?

Come in and lift our irons. We have them all sizes and weights. Buy here instead of from mail order concerns. You will know what you are getting.

You know and I know that there is nothing to be gained by buying through mail order houses. Keep reminding your customers of their troubles with mail order houses and they will come to you in the future.

*By Eva R. Gleason in *Electrical Contractor Dealer*

Hoover Organization Holds Annual Convention

One of the most interesting events of the month has been the convention of the Hoover Suction Sweeper Company of Canada, head office, Hamilton. The convention was held at the Royal Connaught in Hamilton, and was attended by practically every Hoover dealer throughout Canada as well as by the chief officers of the company, who came up from North Canton, Ohio, and Chicago, Ill., on purpose for the event. These officers included Mr. H. W. Hoover, general manager of the company; Mr. H. E. Hoover, director of advertising; Mr. Martin L. Pierce, head of the promotion and research department; Mr. F. G. Hoover, assistant general manager, and Mr. A. W. Fischer, sales supervisor. These gentlemen all addressed the convention as well as a number of Canadian dealers, including Mr. W. G. Blay, sales manager of the Public Utilities Commission, London; Mr. T. A. Cowan, of Brantford; Mr. H. Munroe, of Niagara Falls; Mr. Wm. Findlay, Toronto Globe. An interesting address was also contributed by Mr. Lloyd Maxwell, vice-president Erwin, Wasey & Co., Chicago.

The convention lasted two days, Wednesday and Thursday, 9th and 10th, and was presided over for the most part by Mr. Thomas F. Kelly, sales manager for the Canadian company. Mr. Kelly is known to the trade as a very much



Mr. Thomas F. Kelly

alive wire, and on this occasion, as can be readily understood, business proceedings were never allowed to drag.

The climax of the convention was reached on the evening of the second day when an informal banquet brought all the delegates together for a parting word of encouragement from the president, Mr. W. H. Hoover. The mayor and other local celebrities graced the festive board and contributed congratulatory addresses. An interesting feature of this evening's proceedings was also the presentation of the district manager's cup to Mr. D. C. Gleeson, of Vancouver, leader in the 60,000-in-six-weeks' campaign, which this company had just concluded successfully. This latter accomplishment must be looked on as something unique in the history of vacuum cleaner sales. 60,000 in six weeks is at the rate of approximately 1,500 sweepers per day if the salesmen worked Sundays—which some of them must have done.

No better indication of the aggressive attitude of the sales organization of the Hoover Suction Sweeper Company of Canada, could be given than their slogan for 1921, which runs, "We will sell 45,000 Hoovers in 1921." Unless we overrate Mr. Kelly's organization, this slogan will become a reality.

Attractive Display of Franke, Levasseur & Co., Ltd., Montreal

Franke, Levasseur Co., Ltd., wholesale electrical supplies, Montreal, was organized in 1906 by Messrs. Franke and Levasseur. When this firm first commenced operations the staff consisted of Mr. Franke, Mr. Levasseur, and a stenographer, but the business has increased to such an extent during the past fourteen years that the staff employed now numbers forty.

Mr. George F. Davis, sales manager, joined the firm in 1908 as travelling salesman, which position he occupied until 1919, when he was appointed sales manager. Mr. Davis has been in the electrical industry practically all his life and is thoroughly conversant with both the contracting and the merchandising ends.

The firm are great believers in attractive window displays, as shown by the photograph here reproduced. A large amount of space in the window has been devoted to heating and cooking appliances. Moffat electric ranges taking an important place. Desk and table lamps, together with flashlights, switches, etc., are also very attractively arranged in the window. At the back a rack containing spare parts and attachments for the Regina vacuum cleaner is shown. A feature of the interior of the store is the show-room. This takes the form of a two-storey clapboard house. The interior furnishings are of oak, consisting of a cabinet and tables. The table on the left of the show-room is occupied by table lamps of all descriptions. In the centre on a smaller table toasters, fans, electric irons and desk lamps are shown. A feature of the show-room is the glass cabinet in the rear containing fixture shades. Fixtures of all shape and sizes suspended from the ceiling complete the well laid out display.

The remainder of the store is devoted to electrical contractors' supplies, consisting of wire, conduits, pipe fittings, conduit, switches, etc. These are sold over a counter on the left, which runs the full length of the store. Behind the counter there is a row of shelves containing electrical supplies of all descriptions.

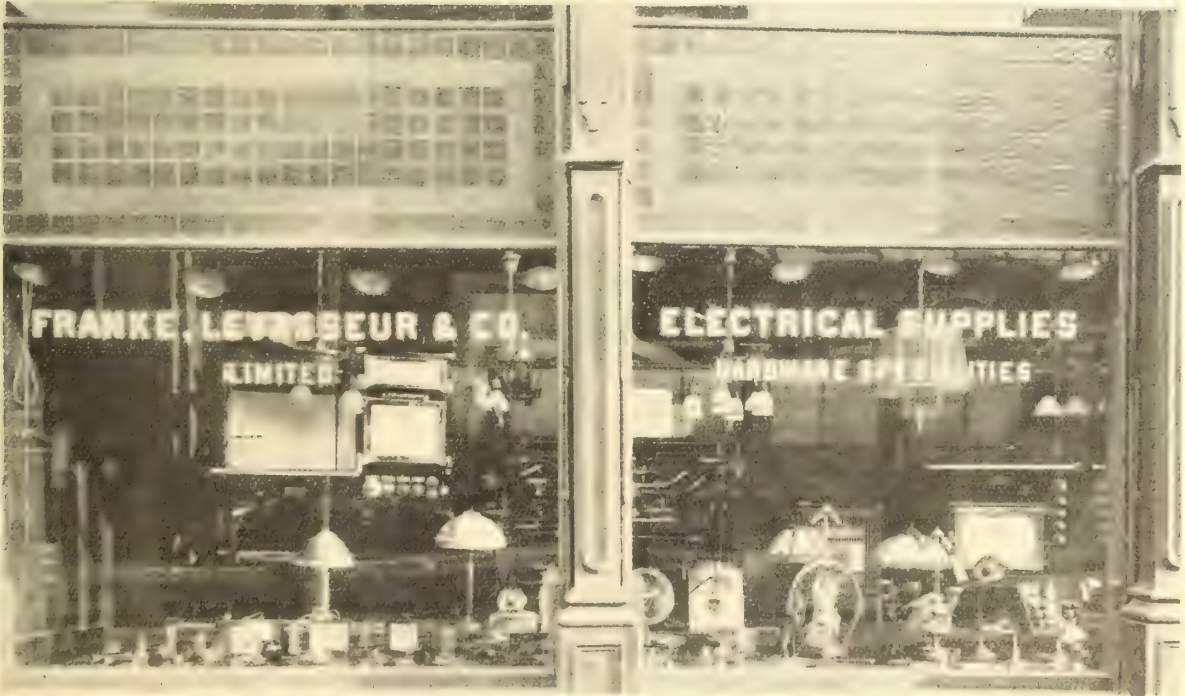
On the left of the entrance to the store is Mr. Davis' private office, which is separated from the rest of the store by a partition about six feet high.

Diamond State Fibre Company are Moving to Larger Premises

The Diamond State Fibre Company of Canada Limited, are moving into new premises in the Wrigley Building, Carlaw Avenue, Toronto, on or about March 1st, twice as large as their present premises. This will enable them more easily to handle the volume of business which the demand for Diamond Fibre products has brought about. They are equipping a thoroughly up-to-date show-room, where visiting customers can inspect this company's products at their leisure. A private railway siding will facilitate greatly the prompt delivery of shipments. This company is to be congratulated on the growing recognition by manufacturers and others of the quality of their products.

Porcelain Covered Cutouts

The Duncan Electrical Co. Limited, of Montreal, are now manufacturing single branch and double branch, double pole 0-30 amp., 250 volt, porcelain covered cutouts, sealed with either wax or heat resisting cement. This fact will be of interest to the trade and electric stove manufacturers in particular.



Interior and window display of Franke, Levasseur & Co.'s wholesale supply house

The Home Appliance Mfg. Co.

The Home Appliance Manufacturing Company, Limited, have opened a factory at 382 Nairn Avenue (Elmwood), Winnipeg, where they intend to manufacture an electric washing machine which is to be named "Community." This semi-cabinet washing machine is to be a purely Winnipeg production. It embodies the best electrical and mechanical construction, is attractive in appearance, and is so designed that all parts are easily accessible. The machine is a mechanical development, not merely an improved washing machine. The Home Appliance Manufacturing Com-

pany, Limited, are at the present time offering stock and expect to be in full manufacturing operation within the next two months. The plant is under the full supervision of Mr. W. R. Smith, who is general manager of the company.

Change of Address

Electrics Limited, Montreal, formerly at 22 St. John Street, are occupying new premises at 517 William Street. These premises give the company increased space and better shipping facilities.

Manitoba Automotive Show

\$200,000 Worth of Automobile Accessories, Including Electric Appliances on Exhibit

The Automotive Show which covered a period of one week, from the 14th to 19th of February, was one of the most successful exhibitions ever held in Western Canada, every inch of space available in the large convention hall of the Winnipeg Board of Trade Building being utilized. The majority of exhibitors report numerous direct sales besides good prospects for the future. A first class orchestra was in attendance each afternoon and evening during the week. Among the booths was noticed a reasonable amount of electrical displays:

The Northern Electric Co., Ltd., among their fine display were showing the Titan Batteries, besides several other lines of electrical equipment for the automobile.

The Canadian General Electric Co., Ltd., had a very attractive looking booth which showed several lines of electrical appliances including the U.S.L. batteries.

Messrs. Miller-Morse Hardware Co., Ltd., Winnipeg, had one of the most attractive exhibits at the show, occupying two booths. One of the chief features of their display was a giant Reflex Spark Plug, 3 feet high, standing in the centre of a half shell, representing an egg. The exterior of the shell was finished in gold and the interior lined with blue silk with a black velvet background. The shell stood 4 feet 5 inches high and was illuminated with the flash system. The Duplex Timer with demonstrator attracted considerable attention and interest as did the new Howe tail light with added feature of search light in connection with regular tail light.

The Mack Battery was also a centre of attraction, being demonstrated by Mr. S. A. P. Clarke of Toronto, on behalf of the Cadillac Motor Sales Co. Ltd., Winnipeg, who are the distributors. During the past three months the Cadillac Motor Sales have sold 2840 Mack batteries in Manitoba alone. Mr. Clarke states that his firm just sold the British manufacturing rights at a very fine figure and has received an order from England to manufacture 20,000 Mack batteries as soon as possible. These will be made in Toronto. All the materials used in these batteries are British.

Mr. A. H. Fraser of Winnipeg, was showing a display of goods made by the Quality Electrical Products Co., of Kansas City.

The Prest-O-Lite displayed a new battery which is shipped in 2 styles, one partly assembled with wood spacers, instead of separate, the other all assembled ready for acid charging made possible by special treatment in installation, the idea being so that the dealer can sell an absolutely new battery. This firm is also now manufacturing a farm lighting battery.

The Canada Dry Cells, Winnipeg, received considerable attention from the public, Mr. A. M. Dobbs, displaying the North Star Battery and Flash Lights—they appear to be very popular and give excellent service. This line is carried by nearly all jobbers.

Another display that attracted a lot of attention was that of the Burd Ring Sales Co., Ltd., who occupied 2 booths. They had a very good display of Hoyt electrical instruments, for the purpose of locating electrical troubles on automobiles. The Hoyt rotary meter for testing out ignition troubles makes five tests at once, and is practically fool-proof. The Hoyt cadmium meter and prods for testing condition of battery plates without taking battery apart and

Hoyt volt meter for dash board, were also shown. Mr. A. G. Perez of Boston, Mass., was demonstrating the Hoyt electrical instruments.

The Canadian National Carbon Co., Ltd., had an attractive display of batteries and flashlights in charge of Mr. Bob Kingsbury, which attracted considerable attention.

The Burgess Batteries Ltd., had a very attractive display of batteries, their colors harmonizing well. This booth was in charge of Mr. Carman and Miss Grundy. We do not know whether it was the batteries or booth attendants that attracted so much attention, but the firm report very good business throughout the week.

Messrs. Canadian Fairbanks-Morse Co., Ltd., were showing several good electrical lines, including the F.B. Ford magneto and coil tester, Onan generator and motor testing stand, and the Onan wrist service ammeter. They report good business during the week.

The Globelite battery came in for a good share of attention and business.

Over 40,000 people attended the Show during the week and on account of the huge success it is anticipated that it will be an annual event.

Personal

Mr. W. E. Douglas, who formerly covered Eastern Canada for the Bluebird Corporation, has now taken over the whole of Ontario province for the Eureka Vacuum Cleaner Co.

Announcement has been made at the International Time Recording Division of the International Business Machines Company, Limited, Toronto. Mr. Morris' connection with the company has extended over a period of ten years, and he has been an active member of the organization in almost every capacity, beginning as an apprentice machinist with the International Time Recording Company, Ltd., in 1909 when International Time Recorders were first manufactured in Canada.

Trade Publications

Bulletin No. 1000-M has just been issued by the Crouse-Hinds Company of Canada, Ltd., Toronto, Ont., describing their condulets for stream and electric railroads and industrial plants. The bulletin is systematically compiled, very detailed in character and well illustrated.

The Wagner Electric Manufacturing Company, St. Louis, Mo., have issued Bulletin No. 123, describing and illustrating their BA and SA types of single-phase motors. The bulletin includes detailed sketches of the various parts with full instructions for ordering and adjusting repair parts.

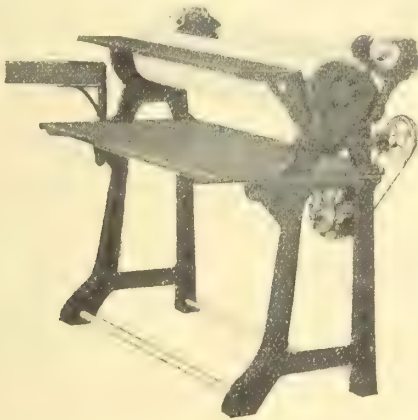
Circular 7A-C-2 has been issued by the Westinghouse Electric & Manufacturing Company, George Cutter Works, South Bend, Indiana, describing and illustrating the Westinghouse Luxsolite Fixtures for street lighting. Style numbers and data on these fixtures, together with prices are given in this circular.

Leaflet 1160-A has just been issued by the Westinghouse Electric & Manufacturing Company, which illustrates and describes the features of the Type CS Squirrel-Cage Induction Motors of this company. These motors are constant speed, continuous rated from 2 horse-power to 200 horse-power, 2 and 3 phase with 25, 40, 50 and 60 cycle, and 110, 220, 440, 550 and 2200 volts. In addition to the discussion on the motor and its parts, the Type A motor and the Type 815 motor starting switch for 10 horse-power motors and below are illustrated.

The Latest Developments in Electrical Equipment

The "Canadian" Household Ironer

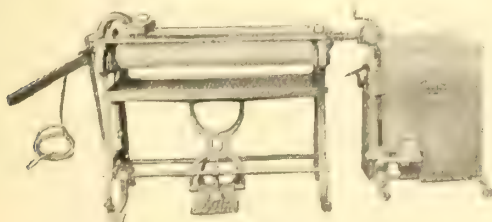
If there is one field that the electric appliance has not yet properly covered it is the ironing machine field. We are glad to be able to illustrate in this issue the "Canadian" electric ironing machine, a household model manufactured by Meyer Bros., 101 Queen Street East, Toronto. This machine is furnished in 46 in., 42 in., and 37 in. actual ironing widths. Motors are supplied standard 110 volts and 220 volts direct current, and 60 cycles, 100 or 226 volts alternating



current. The 46 in. type is equipped with a 1/6th horsepower motor and the other models with an 1/8th horse-power. It is claimed that an ironing that requires 1/2 day to do by hand, this ironer does easily in an hour; that it will finish a table cloth perfectly in three minutes, bringing out the design as though it were newly purchased. The manufacturer estimates that this machine will save the average householder from \$50.00 to \$100.00 per year. The ironing element is heated by electricity or, if required, by gas or gasoline.

Ironer Claimed to Do "All" the Ironing

An electric ironer that is claimed to do all, instead of 75 per cent. to 85 per cent. of the family ironing, has recently been placed on the market by Altorfer Bros. Company of Peoria, Illinois, makers of the A B C Electric Laundress (cylinder-oscillating) and Alco (dolly-type) washing machines. By means of a patented "Iron-All" auxiliary shoe attachment, this new ironer is said to perform any work that a flat-iron will do. The regular mangle is designed to handle the flat work, which comprises 75 per cent. to 85 per cent. of



the average home wash. The balance of the wash—ruffles, cuffs, neckbands, sleeves, shirts, waists, collars, etc., that cannot conveniently be ironed by the large roll—are easily done by the "Iron-All," which is stock equipment. Another feature of the ironer is that it may be had either individually

motored, or with an attachment, in lieu of a motor, that enables it to be driven by any A B C washer, which effects a considerable saving in price to the consumer. The ironer is operated by a broad 15-inch foot pedal and convenient release pedal. The "Iron-All" auxiliary is also foot operated. This arrangement leaves both hands always free to guide the linens. A one-piece, electrically-welded, fireproof steel core is used in the oversize roll which is 8 inches in diameter and 45 inches wide. The gas-heated ironing shoe is designed so as to iron evenly its entire width when heated, and is also rated as oversize. The oversize roll and shoe are said to permit of faster ironing. Exclusive agencies are being allotted through A B C electrical jobbers who are pointing out to dealers that considerable economy is effected in a dealer's sales, advertising and freight costs through being able to handle a complete line of home laundry equipment under one name. The Ontario sales agents are the Central Electric & Supply Co., Toronto; the Quebec agents, Duncan Electric Co., Montreal.

Selling Isolated Plants

A good selling idea has been developed by the Automatic Light Company of Ludington, Michigan. This company manufacture a small isolated electric plant, and the difficulty of salesmanship and demonstration have been largely overcome by installing this plant in a Ford Sedan which may be drawn up close to the door of any country home so that



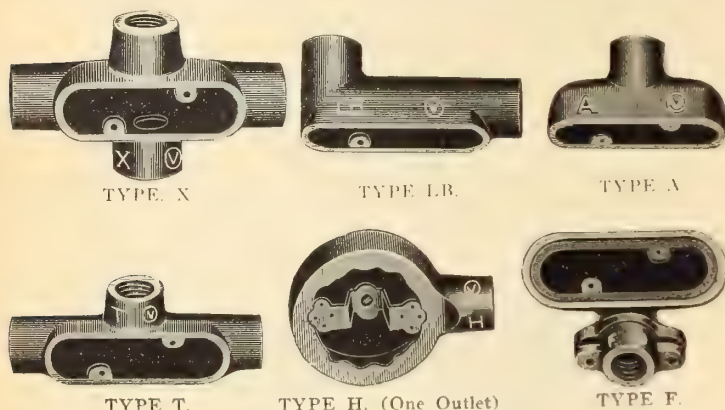
a supply of light may be given almost at a moment's notice. There are two ways to sell electric light plants to the farmer; one is to demonstrate the plant right in the farmer's home; the other includes all other methods which, combined, are not nearly as effective as the demonstration system. The Automatic Light Company appear to have hit upon a method that is both cheap and effective, in addition to which it solves the difficulty of transportation for the salesman.

Winnipeg Understands Co-operation

Mr. L. M. Cochrane of Cochrane & Stephenson Co., Ltd., Winnipeg, arrived in Vancouver, B.C., recently on one of his periodical business trips. During his stay Mr. Cochrane attended one of the regular luncheons of the Vancouver Electrical Club at the Hotel Vancouver, where he was deluged with a shower of questions about the attitude of Winnipeg contractor-dealers toward the co-operative movement which is sweeping the country. Mr. Cochrane assured his questioners that Winnipeg contractor-dealers were well aware of the advantages of co-operation and that they also realized the benefits of the educational work that was being done. He emphasized the excellent results following the installation of simple accounting systems.

Victoria Electric Supply Co. Extending

An interesting and attractively illustrated catalogue for 1921 has just been published by the Victoria Electric Supply Co., electrical jobbers, 77 York Street, Toronto. The catalogue is of the loose leaf type, with each class of goods segregated and numbered, and giving detailed information as to size, weight, measurement, price, etc. The objects of the catalogue are clearly stated in the introductory remarks on the opening page, as follows: "In presenting this catalogue to our customers we have endeavored to furnish as complete a listing of various electrical material in as compact form as possible, thus providing a reference book of standard electrical supplies that can be conveniently carried in the pocket. Information and prices on any material or articles not shown herein will be furnished upon request." Every month the company issue revised price lists in loose-leaf form, so that they can be incorporated into the catalogue, keeping it right up-to-date. The company have just recently



Types of Circle V conduit fittings.

opened a branch at 216-20 Bannantyne Ave., Winnipeg, Man., which for the time being will be under the management of Mr. Wynston, Sr. A complete stock of electrical supplies will be carried, and the western customers will be supplied from that depot. The company announce that they are now manufacturing, at their own foundry, a very complete line of conduit fittings, all of which have been approved by the Hydro-Electric Power Commission of Ontario. Some of these fittings are illustrated herewith. They are made of close grain cast iron, japanned on the inside, and electro-galvanized on the outside. The company's products are known under the name "Circle V." The Victoria Electric supply Co. are also sole agents for the Eagle Manufacturing Co. of Wellsburg, W. Va., manufacturers of glassware for illuminating purposes, and a very detailed and profusely illustrated catalogue of these goods can be had on request.

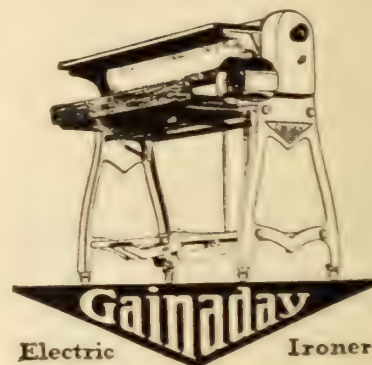
Westinghouse Fans for 1921

A dull black finish on the blades and guards as well as the motor and base is the feature of the line of fans which the Westinghouse Electric and Manufacturing Company will place upon the market for 1921. Previously the blades and guards were highly polished brass, coated with a transparent lacquer. The change of the finish adds materially to the unobtrusiveness of the fans. The absence of a bright finish precludes reflections of light while the fan is oscillating. The six blade fans will be discontinued this year.

An interesting booklet has been recently published by the Wagner Electric Manufacturing Company, St. Louis, Mo., dealing with the Wagner Instrument Transformers. The booklet is well illustrated, and contains a number of diagrams showing dimensions of their different types of transformers and connections for ammeter and voltmeter.

New Power Ironer

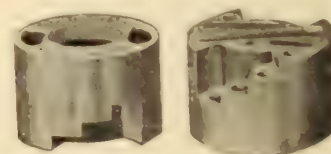
The Gainaday Ironer, manufactured by the Pittsburgh Gage & Supply Company, Pittsburgh, Pa., has been placed on the market. It is electrically operated and heats by gas. The new Gainaday is made in 42 in., 46 in. and 50 in. roll widths, is direct motor driven, and foot-controlled. It can be operated while sitting down. The gear mechanism is completely enclosed, so that dust or loose ends of clothing cannot get into the working parts. The motor is claimed to carry a strong load, and is located on the side, within easy reach of the operator. The motor is controlled by a switch



button located on top. An especial advantage of the ironer is its centre gas-feed which automatically distributes an even heat over the whole ironing shoe. The machine has easy-action casters, which makes it quickly portable. Though easy to move about, it has sufficient weight to make it stationary when in use, without any possibility of tipping.

A Bryant Socket for Lighting Reflectors

To simplify the installation of sockets in reflectors as well as minimize the labor necessary for connecting circuit conductors thereto, The Bryant Electric Company have brought out a new medium base reflector socket which is designated by their catalogue No. 4235. This device is a single piece of ruggedly designed porcelain, with four mounting levels or steps of $\frac{1}{4}$ in. each, providing opportunity



to hold the lamp at four different focuses with reference to the reflector. As will be noticed in the front view shown, the conductors pass through individual holes to the binding screw terminals which are located in shallow recesses in the front or lamp end of the socket. Terminal binding screws are extra heavy and long, and are staked to prevent being backed out all the way and lost. No caps are provided with these sockets as it is a simple matter for reflector manufacturers to supply the style of supports best suited to their particular style reflectors or holders. Another advantage claimed for this style of socket is that the means of supporting socket in reflector can be so arranged as to be accessible from the front or lamp end of socket. This socket is $2\frac{1}{4}$ in. in diameter, $1\frac{9}{16}$ in. deep, holes for supporting screws are $\frac{3}{16}$ in. diameter, spaced $1\frac{27}{32}$ in. on centres.

Net revenue for the year 1920 of the Kaministiquia Power Company was \$102,695, as against \$119,671 in 1919. The net revenue for the year was restricted by expense of labor, supplies and high taxes, together with the carrying out of certain maintenance work which had been deferred during the war.



Electric Railways

Publicity and Public Relations

The Urgent Need of a Better Understanding Between Utility and Public Driven Home by Address at Recent Ottawa Street Railway Convention

By A. W. McLIMONT

To-day the majority of the street railway companies of Canada may be said to be standing at the cross-roads. To the left a broad and easy way leads on to the graveyard where obsolete and bankrupt transportation systems rust, while to the right a narrow and rugged path runs to a place where modern transportation systems operate on a financially sound basis because the communities they serve are interested in their problems and will co-operate with them in mutual interests.

There is no question which path we wish to take. We all want to continue to serve the public. How then shall we reach this Utopia of street railways? My answer is:

I believe it is the duty of a street railway manager to let the public know the facts about any phase of the street railway business that concerns them.

I believe we should lay our problems before our patrons—not as suppliants—but as one business man presents a mutual problem to another—with a view to securing assistance in solving it.

I believe when we ask the public to pay the increased fares necessary to enable us to render adequate service we should tell the reasons why. We are vendors of transportation, a "place utility," as the economist would say, as important to society as any manufactured product and as the manufacturer sells his product so must we sell transportation.

I believe the public is square, and that once we induce people to think and talk about street railway problems, public opinion in our favor will become such a powerful factor that the authorities will give the street railways a square deal.

Right Public Relations

Let us first consider Right Public Relations: To secure them:—

1. It is essential that our equipment be clean.
2. It is essential that we shall keep faith with our employees and treat them fairly.
3. We must be truthful.
4. We and the members of our organization must be good citizens of the community in which we live. We must "boost" when boosters are needed, and work for the public good whenever that is possible.
5. And above all, we must make up our minds that it is our business to endeavor to determine how we can best serve the public.

Proper publicity requires:—

1. That any statements we give to the press or to the public in any form shall be the truth.
2. That we shall live up to what we have already stated we believe about right public relations, because proper publicity and right public relations go hand in hand.
3. That we shall practice what we preach.

We must lay our problems before everyone interested in them if we are eventually to secure a square deal for the properties we represent. When we tell people the physical property of the railway is run down—because revenues are inadequate or that the street railway is paying unfair and burdensome taxes we are met with the questions—

"Who knows about it? How can you expect to get redress if you don't tell the public the facts?"

Therefore we try to tell the public the facts and interest the public in us and our problems.

Means of Informing and Interesting the Public in Street Railway Problems

Winnipeg Electric Railway Company decided the best way to do this was:—

- (a) Through a publicity agent—charged with the duty



A. W. McLimont, vice-president and general manager Winnipeg Electric Railway Co.

of establishing and maintaining friendly relations with newspaper men.

- (b) Through briefs distributed to interested persons and organizations.
- (c) Through poster announcements pasted on street car windows.
- (d) Through an official publication distributed free in the street cars.
- (e) Through paid advertisements in the newspapers.
- (f) By means of large advertising cards in frames placed on the outside of our street cars.

Let me elaborate upon these various mediums a little

- (a) The Publicity Department of Winnipeg Electric Railway Company was established on March 1st, 1918, in

charge of H. C. Howard, a young newspaper man. The then main duties which fell to this department were:—

1. To establish good relations with the newspapers—largely through personal contact with the editors and reporters.

2. To prepare every two weeks an issue of "The Public Service News," a pamphlet for free distribution through boxes in the street cars.

3. To prepare advertising and all publicity matter pertaining to the company.

Considerable progress has been made towards establishing better relations with the newspapers. It is our policy to work closely with them and see that they are given accurate and reliable news. They appreciate this and generally treat the company fairly.

"The Public Service News" is issued every two weeks and has now reached a circulation of 40,000 per issue. It has proved a powerful influence in the bettering of public relations.

Generally speaking, it is the aim of the publicity department to keep the name of the company prominently before the public, to see that all new developments and items of general interest pertaining to the company are recorded in the local press, and through co-operation with organizations promoting worthy causes, to better public relations.

(b) When we were asking the city to pass a by-law eliminating the unfair jitney competition to our transportation service, we prepared a brief with reference to the question entitled, "Statement of the Problem of Street Transportation as it affects City of Winnipeg, Manitoba," and had

It is the duty of a street railway manager to let the public know the facts about any phase of the street railway business that concerns them.

a large number of copies distributed to those interested. This brief was widely read and quoted and no doubt was a factor in the final elimination on May 1, of jitney competition to our transportation service.

(c) From time to time as various questions concerning the street railway arise, we print an official statement, bearing my signature as vice-president of the company on large posters and paste these posters on the car windows, sometimes as many as four posters to a car. The rolling stock department is responsible for placing the posters on the cars, and the work is done at night when the cars are in the barns. By this method we are able to reach all the car riders over-night.

We also use car window posters to announce charitable entertainments or special sporting or other events in which our organization is interested.

A number of special "Safety First" drawings have appeared on window posters and have helped prevent accidents. I feel sure you will be interested in our "Jay Walker" series—samples of which are before you with other samples of our posters.

(d) Since the first copy of the Winnipeg Electric Public Service News was issued, 2,400,000 copies have been printed and distributed free, mostly through the "Take One" boxes in our street cars. We also have a mailing list of about 1,000 names to which it goes each fortnight. In this official organ we endeavor to set our operating and other problems before the public. We never "knock." If we can't boost we try our best to keep still.

Each new issue of the Public Service News is announced by a window poster in the cars, and our experience is that the available supply of pamphlets is soon exhausted.

(e) The properly written and attractively set up paid

newspaper ad. is in my judgement one of the best, if not the best, medium for reaching the members of the community. This method of publicity is necessarily expensive and we only use it for special announcements.

For instance—When the Manitoba Public Utilities Commission granted us an increase in fares this fall, the city started an action in the courts to upset the increase and have the Public Utilities Act declared ultra vires.

We desired to convince our patrons and the public generally that the verdict of the commission was a fair one and that the city was not justified in opposing it. We therefore ran a series of full-page advertisements in all the daily papers and most of the weeklies in Winnipeg explaining the whole matter. These advertisements together with window posters in the cars on the same subject, and articles in our own Public Service News, threw much needed light on the situation, and we believe influenced local public opinion in our favor.

The Winnipeg Street Railway problem was one of the issues in the Winnipeg election this year. The mayor for 1921 was elected by a large majority. His platform is that he favors a round table conference rather than litigation so far as the street railway is concerned, and before he was elected he gave the voters clearly to understand that he favors granting the street railway a fare that will ensure adequate wages and enable us to operate the necessary material to carry on.

(f) On the outside of each standard passenger car in Winnipeg we have placed five metal holders. Each holder takes an advertising card 22 inches by 26 inches. The privilege of placing these cards on the street cars is leased to a local advertising company on a percentage basis; the street railway retaining, of course, space for its own use. Only cards advertising traffic-producing events are permitted to be thus displayed by the advertising company, but the Street Railway Company displays such slogans as "Street Cars Can't Dodge," "Please Have the Exact Fare Ready," etc., which are printed on the backs of the regular advertising cards, and are used in the company's card space. Cards are placed in these frames on the outside of the street cars at night by the rolling stock department, and it is possible to change all the cards over night. Photographs of sample cars carrying these cards are here for your inspection.

Meetings of Heads of Departments

I have confined my remarks up to this point to various means which our company is employing in informing and interesting the people of Winnipeg in the street railway problem there. The success which we have had in this direction is not, however, fully attributable to the means which I have thus far explained. Much of it is I am sure due to the results obtained indirectly from the attitude of the various members of my organization. I refer particularly to their apparent desire and aim to serve the public efficiently.

As a means of getting my entire organization striving to serve the public well, weekly meetings of the heads of departments are held in the directors' room. At these meetings everybody is made to feel as free from restraint as possible, in order that a frank discussion can be held of difficulties in each other's departments which may be overcome through consultation with the heads as a whole and also that suggestions may be received by the organization from anyone upon any subject that is of interest to the company.

I am sure every manager who holds periodical meetings of heads of departments along the lines I have suggested finds beneficial results. Better co-operation is obtained among the departments through the men becoming better acquainted personally and more or less familiar with the

workings of each other's department. There is no amount of printed matter that can obtain the same co-operation and efficiency as can the personal contact of the members of an organization meeting in a free discussion of their many problems.

At these meetings I have repeatedly impressed upon my organization the fact that they must work under the principle that we are like a factory producing things for the public to buy. We produce cubic feet of gas, kilowatt hours of electricity for light, heat and power purposes, and furnish car miles for transportation. I tell them that these services must be produced in the most efficient manner and at the least possible cost in order that they may be sold to the public at an acceptable figure. I point out that we must have our customers like our service and the things we sell in order to obtain support and patronage and that without satisfying customers we cannot expect to be successful any more than any other commercial enterprise.

I feel certain that it is largely through such means as I have related that the Winnipeg Electric Railway has been successful in having its fares increased three times within the past two years and that jitney competition, which for a time seriously threatened to upset the street railway service, has been abolished. Moreover, there has been no disagreement with the company's railway employees of sufficient importance to warrant the employees to strike; the only strikes which have occurred were sympathetic ones and were not entered into because of disagreements with the company.

Conclusion

In conclusion, I wish to reaffirm my faith in the statement that the public is square and that eventually the street railways of Canada will be given a square deal if the public is given the facts.

I am not pessimistic in my views of what the future has in store for the street railway business, because I believe that proper publicity coupled with a sincere desire to give efficient service will help our reaching the street railway's Utopia. At any rate it will prevent our business from going to the graveyard where obsolete and bankrupt transportation systems rust.

Discussion on the Paper "Publicity and Public Relations"

By MAJOR F. D. BURPEE
Manager Ottawa Electric Railway Co.

I have been very much interested in Mr. McLimont's paper because we, in Ottawa, have been trying to win and hold the good will of our customers, in a somewhat similar way.

The January Aera contains two splendid articles on street railway publicity, one by Myles B. Lambert, of the Westinghouse Co., and the other by Bernard J. Mullaney, of the Illinois Committee on Public Utility Information. Both of these should be read by anyone interested in this subject.

Speaking entirely without local application, the street railway industry has always experienced more or less marked hostility from the press, public officials and the public. It has become a popular pose to regard us with suspicion. There is always the feeling that in knocking us one is taking the side of the under-dog, the poor individual against a rich, autocratic, soulless corporation, sometimes termed "a malefactor of great wealth," a double-barrelled insult to those of us who are trying to get along on a five-cent fare. That is the usual state of mind of juries when

they listen to the arguments in a street railway damage case.

And in the past we railway men have helped the growth of that unfriendliness by doing little to offset it. How many managers when their companies have been attacked in the press, have dismissed the matter by saying, "What's the use of getting into an argument? They have to ride anyway." Or if they did reply, only made matters worse by sarcasm or evasion. The public love a scrap, and the more bitter it is, the more news value it possesses. It amuses them for the time, but it does permanent harm to the railway company.

We can't all be perfect. Let us admit that complaints are sometimes justified. Being reasonably sure of a certain revenue, have we always considered it necessary to work for the friendship of our customers?

Mr. Lambert in his article observes that the absence of public good will is the biggest obstacle in the path of the electric railway industry. He defines public good will as "Confidence in the company, its officers and its employees; a desire to see it progress and prosper; and a willingness to co-operate with it in every possible way."

The hostility we have experienced in the past is mainly due to lack of knowledge of our business, and the difficulties and problems we have to contend with. The attitude of the press and public officials exists because they think it is a reflection of the feelings of the people. There is no doubt



Major F. D. Burpee

we can remove that spirit of unfriendliness, and substitute for it, good will and co-operation, if we go about it the right way, and keep everlastingly at it.

I will again quote from Mr. Lambert, "Good will is created and built up in innumerable ways. It is a continuous performance on the part of every one associated in any way with the railway company. If every employee fully appreciated the importance and great value of maintaining and strengthening the good will of the public and kept this uppermost in their minds each day, the progress and prosperity of their company and themselves would be greatly enhanced."

There is a triangle of interest in every street railway. The public—our customers; the company, by which I mean those who direct the policy and operations of the railway; and the employees, those who carry out the policy and direction of the company. Good service is necessary for the welfare of the community. The most efficient service and

the greatest prosperity for all can only be obtained with the full co-operation of these three.

Has it ever occurred to you that every company has, in its staff of employees, hundreds of excellently placed agents, that only need a little training to be a most effective force in winning and holding the friendship of our patrons? For every request for information received at the company's office, hundreds are being daily proffered to our conductors and to some extent our motormen. We can train our employees so that they will be thoroughly imbued with the importance of making friends, and that to have the good will of their passengers will make their work much easier, and be a valuable asset to them as well as to their company.

We have tried to impress on every member of our staff that discourtesy is the unforgiveable sin. Every request for information or assistance, every complaint, whether justified or unreasonable, is an opportunity to make a friend or to conciliate an enemy. It is most important to resist that human inclination to answer criticism with sarcasm or smartness, and if we do so, we play right into the hands of our enemies, and confirm them in their convictions.

To successfully educate our employees to win the good will of the public, we must first win the good will of the employee. We can teach them courtesy by receiving all complaints and suggestions from them in that spirit, and show them that their comfort and welfare is always being considered. We should give them all the information we can, and encourage them to keep informed of the details of our business and the local transportation problems, so that they can intelligently meet the public as agents of the company. We should encourage them to take a pride in their work, so that they all will pull together to produce good service, which is, after all, the best means, of winning the good will of the public.

For some years back we have published a leaflet for our employees, called the "O. E. R. Bulletin." It was primarily intended to repeat in permanent form the important bulletins issued during the previous month, but to this has been added articles dealing with the most efficient methods of operation; the prevention of accidents; and the importance of handling our customers so as to win and retain their friendship. This publication goes to our men with their pay on the 20th of each month, and I am satisfied it is carefully read and appreciated. It is an excellent means of imparting to them our general policy, and enlisting their co-operation.

Mr. McLimont has described the various means used in Winnipeg to remove public hostility by educational propaganda. Many of us cannot afford so elaborate a programme, but we can all do something, and must suit the will to the purse. We must first recognize that the public is an interested party, and entitled to all the information we can give. Mr. Mullaney says, "As ignorance breeds suspicion and hostility, so education and enlightenment will breed friendliness."

The public press forms an excellent medium of keeping in touch with the public. It brings us in close contact with the newspaper people and gives us an opportunity to discuss their attitude and policy toward our business.

Letters of complaint or criticism appearing in the press should always be answered. If the cause of complaint can be removed, so much the better, but from a publicity standpoint it is essential that an answer be published. The complainant may be voicing the sentiment of hundreds of others, and a good occasion is provided to reach all of them.

While on the subject of complaints, let me point out that while we don't like to receive them they do afford chances that should not be overlooked for making friends. Every complaint by letter, telephone or verbally given, can

often be handled so as to make a friend of the complainant. If the complaint is justified, it should be admitted and corrected. If it is unreasonable, it can be explained away. The important thing is to receive it politely and show that it is being promptly considered.

Whatever means of publicity are adopted, one that should not be overlooked is the publication of a small leaflet distributed directly to passengers on the cars, such as the Winnipeg "Public Service News." It reaches the people we are most concerned with—the car riders. It gets into their hands at a time when they have nothing to do, and is doubly welcome because it provides them with some entertainment during that time.

Such a publication must, above all, be truthful. It must be readable. The articles it contains must be written from the standpoint of the car rider. It must be entirely free from sarcasm, bitterness, or jokes at the expense of the public. There are plenty of subjects to write about; accident prevention; means by which the car rider can help to improve the service to his own advantage; facts about the industry in other places; local transportation problems and their solution; explanations of the technique of our business; and dozens of other interesting topics.

Mr. Mullaney says in this connection that "Matter which utility managers think is 'great stuff' is probably poor stuff. The utility manager is seldom a good judge. He sees only one side of the case, and his judgment of the other side is obscured." He also says, "To be effective, educational publicity must 'come clean' both in methods and motives." "Facts, not arguments, should be the foundation of all publicity effort."

We have been issuing a publication of this kind for the last eighteen months. Copies of the last number greeted you on your arrival. We place 10,000 in our cars every Saturday morning, and they are all gone by noon. We do not use a box, but hang them in bundles by string from the strap rail and ventilator rods, where they can be easily seen.

As an example of the utility of our little sheet, I will mention that last year we cut out 25 per cent. of our city stops. Before doing so, we announced the change in several issues of the O. E. R. News, and explained the improvement in the service that would result. There were no complaints—because our patrons know why it was done.

I am a firm believer in company publications for the public and our employees, but they should not be undertaken unless with the intention of making them permanent. If they are inaugurated to accomplish some definite object, and then dropped, it will only increase that suspicion and hostility that have in the past magnified our difficulties and hindered us in our operations. Nothing should at any time be published that we cannot stand behind. If our readers once get the idea that we are trying to "slip something over," all our work for good will and co-operation will be nullified.

Finally, let us realize that the friendship of those we serve is the most valuable asset we can possess. It is very susceptible to change, and will grow or decrease according as we and our officials and employees work to acquire and hold it. It can only be permanently retained by constant effort, but will repay us a hundred-fold for all the time and money we can devote to it.

Toronto civic car line statistics for January show a growth of 20 per cent. in the revenue and 21 per cent. in the number of passengers carried, as compared with the same month a year ago, as follows:

	January 1921	January 1920	Increase
Passengers carried ...	3,025,700	2,493,296	532,404
Passenger revenue ...	\$50,392	\$41,959	\$8,403

Local Improvement Plan Suited to Street Railway Extensions

One of the suggestions which the Toronto Transportation Commission has put forward in order to relieve the demand for transportation facilities at different points in the outskirts of the city, is that extensions in these districts should be financed on the local improvement plan. This plan would apply first, in all probability, to a line running north and south parallel with Yonge Street through Mount Pleasant Cemetery. Any district, however, desirous of obtaining better transportation facilities could receive the immediate attention of the Commission, if such district were willing to co-operate on the basis of the local improvement plan.

A big fight has been waged for years in the city of Toronto to keep fares at the rates established when the system was built, and if it is the expectation of the public that these same rates can be maintained under municipal management, or even if it is hoped to keep them from being greatly increased, it will be necessary to keep general expenditures as low as possible. Outlying districts must not overlook the fact that an extension of the railway system in their direction does not add anything to the revenue of the system. On the other hand, it seems only fair that inasmuch as they receive a longer ride for the same fare, they should pay something more for the privilege. Another consideration is the increase which invariably takes place in land and other property values where the railway system is extended into a new district.

Since the suggestion was made by the Transportation Commission, meetings have been held to discuss the matter, and the tendency seems to be for the various districts that have been clamouring for street railway service for some time, to oppose this method of payment. If they will consider just those two points: that they receive transportation for the greater distances for the same fare, and that their property will be increased in value—double in many cases—the opposition to the scheme should not be very active.

The Transportation Commission have gone to considerable trouble to lay both sides of the question fairly before the public, and have issued in pamphlet form general conditions affecting the matter. This pamphlet is of general interest and particularly the following extracts:

Street Railway Extensions and Local Taxation

One of the most costly tasks confronting a street railway system is the construction and operation of development lines into new districts. Even apart from the capital cost there is sure to be for many years on such lines a heavy deficit on operation. This, of course, in the case of a publicly owned enterprise has to be met by the users of the system, and is the one factor in the determination of fares to be charged.

On the other hand nothing so obviously and surely increases the value of land in and about a city as the furnishing of adequate transportation facilities to a section in need of the same. A district may have every natural advantage and may be developed in such a manner as to give it every community advantage, yet people cannot and will not live there unless they can reach it rapidly and easily.

Some years ago the City Club of New York made a scientific investigation of the effect on property values of the construction of the first New York Rapid Transit Subway from the Battery to the Bronx. It was discovered that those portions of Upper Manhattan and the Bronx most directly affected were in seven years increased in value \$80,500,000 beyond the general increase for that period, yet the

cost of the portion passing through such districts was \$13,000,000.

It is plain that it would have paid these landowners to have constructed this subway out of their own resources, and indeed certain landowners in California found it to their advantage to build surface lines at their own expense to be handed over to an Operating Company.

In 1915 the Toronto Transportation Committee made an analysis of 1,525 representative transfers of property served by the civic car lines during the five years from 1910-14 inclusive. This investigation showed that in this period this property increased in value 134 per cent. Deducting the average increase in value throughout the city during the same period, namely 66 per cent., it showed an increase of 68 per cent. attributable mainly if not solely to the building of these lines.

If the whole of the cost of these lines had been assessed locally it would have amounted to only 6 per cent. of the original value of the property, or but 8.8 per cent. of the increase in value conferred upon the property by the building of such lines.

In spite of this great local benefit these new lines were paid for by the taxpayers generally, the landowner for example on Danforth Avenue paying no more towards their cost than the landowner in Parkdale, to whom such lines were little if any advantage.

The mere statement of this situation is enough to disclose its obvious unfairness. Certain fortunate landowners have profited greatly by a public enterprise to which their contributions have been trifling. It can be no more right that the many should be taxed for the benefit of the few than the few should be taxed for the benefit of the many, and there can be nothing inequitable in insisting that those who have profited so greatly by a public enterprise shall return a portion of such profit to such enterprise.

As a matter of fact this principle has been recognized as axiomatic everywhere and so far as known there is no civilized country that has not adopted the principle of local taxation for local benefit. The underlying idea is quite simple. It is that a landowner whose property is plainly benefitted by reason of a public work shall not pocket such benefit entirely free of cost to himself but shall give back a portion thereof to the public. That this is in accord with public sentiment was made manifest at the last municipal election when the electors voted nearly six to one in favor of laying water mains as local improvements.

Many students of economic problems are of opinion that the public have a right to a portion of what is popularly called "the unearned increment," i.e., value created by the general growth and development of the community. Far stronger than this is the right of the public to a share of that increment which is not unearned, but earned by the public through its enterprise.

To make the application of the principle a success in practice it is desirable that the benefit should be to use a phrase common in English legislation, "substantial and permanent." In Ontario, the Local Improvement Act permits local taxation where the local benefit is, if not open to question, at least not always apparent. Nevertheless there has been no important opposition to this legislation. Why then should not local taxation be applied to lands improved by railway extensions where as we have seen the benefit is most pronounced? The idea is not entirely novel, for in 1911 the New York State Legislature inserted a clause in the Rapid Transit Act whereby the cost of future rapid transit lines could be met in whole or in part by local taxation.

In passing it may be said that since the proposal was first mooted, certain public discussion has seemed to assume that the local levies would be analogous to those for a

sidewalk or pavement, i.e., by a frontage tax. But this would be clearly unjust and impracticable. The assessment of benefit, as in the case of a street widening or extension under the Local Improvement Act must be left to the judgment and discretion of a competent authority and it may very well be that the street on which the street railway actually runs will be benefitted very slightly in comparison with other nearby streets. Further as is the case with other local improvement taxation the levy would be spread over a period of years.

In opposition to the idea of local taxation it is frequently urged that increased values mean increased assessments and that the increased taxes an owner pays constitute his contribution to the cost of the work. It is then said that to ask him to pay local taxation is asking him to pay double for the same purpose. The fallacy of this argument lies in the suggestion that ordinary municipal taxes are in any sense akin to those special levies. The former are a payment for general services rendered by the community and not a payment for local benefits. On the other hand local taxation is a capital levy justifiable only if property levied against is increased in value by at least the amount of the levy.

To examine this contention let us take a concrete case. A person has a lot worth \$1,000 which is increased in value \$1,000 by reason of the construction of a car-line in its vicinity and in respect of which therefore he is asked to pay, say \$100 spread over a term of years as local taxation. He then has a lot worth \$2,000 which has cost him \$1,100 and obviously has little of which to complain. He can realize his profit or use or hold the lot, but in any case it is worth \$2,000 and he has gained \$900.

Another common objection is that those from whom contribution is sought have already contributed through their general taxes to other schemes which have produced local benefit and therefore they are entitled to reciprocal treatment as regards a scheme which will benefit them.

But it is rather difficult to see why because A has received more than he is entitled to at the public expense, B has any vested right to such treatment merely because he happened to be a member of such contributing public. Two wrongs never make a right and what is popularly known as "log-rolling" cannot be defended on any logical grounds.

Needless to say the great bulk of the citizens, even of those owning lands, have no hope of ever profiting by increases in value due to street railway extensions.

The proposal in question has support of both students of taxation and practical civic administrators. For example it has been endorsed by the City Planning Conference of North America, Hon. Lawson Purdy, President, Department of Taxes and Assessments, New York City, Nelson P. Lewis, Chief Engineer, Board of Estimate and Apportionment, New York City, Prof. E. R. A. Seligman, and Bion J. Arnold.

In 1919 a Federal Electric Railways Commission was appointed by the United States Government to report upon the electric railway situation in the United States. Its personnel represented the regulatory commissions, the railways, the investors in railway securities, the labor interests, the municipalities, and certain departments of the Federal Government. One of the conclusions of their unanimous report presented in August, 1920, was "Extensions into new territory resulting in special benefits to the property in the vicinity should be paid for by assessments on such property in proportion to the benefits received, and the amount of such assessment should not be added to the physical value of the corporate property."

Vancouver Section A.I.E.E. Hears Discussion on "Electric Traction"

Describing the advances in electric traction from Edison's first electric locomotive in 1880 to the giant locomotives recently put in service on the Chicago, Milwaukee & St. Paul Railway, mountain division, Mr. F. W. MacNeill of the Canadian General Electric Company, in an address to the Vancouver Section of the American Institute of Electrical Engineers in the auditorium of the Board of Trade Building, on February 4th, pointed out some of the reasons why electric traction had been adopted, and the advantages and profits which had accrued.

"The handicap of steam locomotion," he said, "was the necessity for converting the back and forward thrust of the engine into the rotary motion of the wheels. Up grade trains on mountain sections of the Chicago, Milwaukee & St. Paul Railroad, used seven times as much coal as was required on the level. To-day, following the electrification of



Mr. F. W. MacNeill

this part of the road, these trains are hauled up-grade by the expedient of using gravity in a descending train to reverse the functions of the motors and turn them into dynamos each producing 450 h.p. in current which is turned back into the trolley wires." Mr. MacNeill suggests that in the future whole towns may be able to draw their power from electricity manufactured by trains descending mountains which act as travelling power plants.

Speaking about the advantages of electrifying mountain sections of existing railroads, Mr. MacNeill said that the electric motors never froze up and that while delays were frequent under steam, there has never been any delay on electrically-driven roads. "One of the advantages appertaining to railroad men," the speaker said, "is that an electric locomotive will deliver 200 cars where 96 were delivered by steam. The same engine will haul a 55 car train up hill at 16 miles an hour where steam would only haul it up the same grade at a maximum speed of 7 miles per hour."

The first annual report of the Seaboard Air Line & Norfolk Railway System under Hydro-electric control published recently, shows a net profit of \$22,000. Total earnings of the road for the first year amounted to \$290,000, out of which came all expenditures for up-keep, wages and repairs. There was also set aside \$49,000 for interest on bonds and \$83,000 for sinking funds. Assets for the system are estimated at \$2,144,755, while liabilities are \$1,849,000. The company are planning extensions which will involve an expenditure of about \$1,000,000 in the next five years.

Report of the 28th Annual Meeting

of the

Winnipeg Electric Railway Co.

Held February 9th, 1921.

At the annual general meeting of the Shareholders of the Winnipeg Electric Railway Company, held in the head offices of the Company, on Feb. 9th, 1921, the report of the president and directors and the financial statements for the year ending December 31st, 1920, were presented and adopted.

The following directors were elected for the ensuing year and until their successors are appointed: Sir Augustus Nanton, A. W. McLimont, Hugh Sutherland, George V. Hastings, J. D. McArthur, G. W. Allan, K.C., A. J. Nesbitt, W. J. Bulman, and W. R. Bawlf.

The following are the officers of the Company for the ensuing year: Sir Augustus Nanton, President; A. W. McLimont, Vice-president; F. Morton Morse, Secretary; L. Palk, Assistant Secretary and J. S. Mackenzie, Treasurer.

The report of the President and Directors stated:

The gross earnings for the year 1920 show an increase of \$949,221.54 over the previous year. Notwithstanding the heavy increase in wages and other operating expenses, the net income shows an increase for the year of \$498,720.12.

The year 1920 began with prices of commodities and labour climbing upward at a rapid rate, and while it did not seem possible that this ascent could continue indefinitely, the first half of the year had elapsed before there appeared any sign of the peak having been reached.

In July a Board of Arbitration awarded increased wages to the Company's employees, such increase being made retroactive to the 1st May. As a result of the Company's application to the Manitoba Public Utilities Commission, increased rates were granted and an appraisal of the physical value of the Company's property was arrived at. The increased rates and fares authorized assisted in offsetting the increased operating expenses which had resulted from the rising costs of material and labour.

In April last the Company's south Main Street car barn together with 21 cars and other equipment were destroyed by fire. A new fire proof, fully modern car house has been erected on the site of the old one and all rolling stock destroyed has been replaced. Something over \$300,000 was recovered from insurance.

The different utilities of the Company all show a satisfactory growth over the preceding year. The gross earnings of the Company exceeded those of 1919 by \$949,221.54.

The Company has continued making extensive improvements in all departments and in that connection has expended during the year more than \$900,000. This includes replacing property destroyed by fire.

It will be observed that after payment of all fixed charges, and making provision for depreciation, the Company made a net profit of nearly \$600,000.00,

which is substantially the best showing of any year since 1914.

For the purpose of retiring as far as possible the Company's floating liabilities, a new issue of Preferred and Common shares was authorized, which stock is being placed on the market and it is expected will all shortly be disposed of.

The Company has continued its policy of providing the public with adequate service, and seeks to establish and maintain good relations with the public, realizing that the welfare of your utilities is a matter of public consequence, which policy we believe has met with a marked degree of success.

Respectfully submitted,

A. M. NANTON,
President.

Gross Earnings from Operations	\$5,233,700.65
Operating Expenses, before charging Depreciation	3,428,897.43

Net Operating Revenue	1,804,803.22
Miscellaneous Income	76,700.11

Income available to meet fixed charges, etc.	1,881,503.33
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From which the following deductions are made:

Interest charges on Debt— ture Stock, Bonds, Gold Notes, etc.	\$716,214.85
Extinguishment of Discount on Securities	26,786.76
City Percentage and Car License Taxes	181,249.01
Taxes	127,239.43
Miscellaneous Non-Operat- ing Expenses	2,942.31
Other Income Deductions .	30,495.74

1,084,928.10

Net Income as shown on Accounts sub- mitted herewith, excluding Deprecia- tion	796,575.23
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Deduct:

Depreciation	201,050.00
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Net Income Transferred to Surplus....	595,525.23
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Surplus brought forward from 1919 as Adjusted	1,314,420.29
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Net Income for year transferred	595,525.23
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Dividend on 7% Cumulative Preferred Stock	4,444.16
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Sinking Fund Appropriation	60,000.00
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Surplus Carried Forward	\$1,845,501.36
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Report of the 28th Annual Meeting of the Winnipeg Electric Railway Company Held February 9th, 1921

The annual general meeting of the shareholders of the Winnipeg Electric Railway Company was held on February 9th. The report of the president and directors was very satisfactory. It stated that the gross earnings for the year 1920 show an increase of \$949,221.54 over the previous year; also notwithstanding the heavy increase in wages and other operating expenses, the net income shows an increase for the year of \$498,720.12. Net earnings were approximately \$600,000, the best showing since 1914. The surplus carried forward is now close to two million dollars.

The following directors were elected for the ensuing year and until their successors are appointed: Sir Augustus Nanton, A. W. McLimont, Hugh Sutherland, Geo. V. Hastings, J. D. McArthur, G. W. Allan, K.C., A. J. Nesbitt, W. J. Bulman and W. R. Bawlf. The officers of the company are: Sir Augustus Nanton, president; A. W. McLimont, vice-president; F. Morton Morse, secretary; L. Palk, assistant secretary; and J. S. MacKenzie, treasurer.

The year 1920 began with prices of commodities and labor climbing upward at a rapid rate, and while it did not seem possible that this ascent could continue indefinitely, the first half of the year had elapsed before there appeared any sign of the peak having been reached. In July a Board of Arbitration awarded increased wages to the company's employees, such increase being made retroactive to the 1st May. As a result of the company's application to the Manitoba Public Utilities Commission, increased rates were granted and an appraisal of the physical value of the company's property arrived at. The increased rates, and fares authorized assisted in offsetting the increased operating expenses which had resulted from the rising costs of material and labor.

In April last the company's south Main Street car barn together with 21 cars and other equipment were destroyed by fire. A new fire-proof, fully modern car house has been erected on the site of the old one and all rolling stock destroyed has been replaced. Something over \$300,000 was recovered from insurance.

The company has continued making extensive improvements in all departments and in that connection has expended during the year more than \$900,000. This includes replacing property destroyed by fire.

For the purpose of retiring as far as possible the company's floating liabilities, a new issue of preferred and common shares was authorized, which stock is being placed on the market and, it is expected, will all shortly be disposed of.

The company has continued its policy of providing the public with adequate service, and seeks to establish and maintain good relations with the public, realizing that the welfare of public utilities is a matter of public consequence. In this policy we believe the Winnipeg Electric Railway Company has met with a marked degree of success.

The annual report reflects great credit on the administrative ability of Mr. A. W. McLimont. Mr. McLimont took charge of the property in October, 1917. At that time the company's fortunes were decidedly low. Jitneys were on the streets eating into revenues at the rate of nearly a million a year, franchise fares were in effect, and there was considerable litigation pending between the company and the city. The feelings of the public towards the company, too, were not of the friendliest and the property was in a run-down condition.

By adopting a broad frank policy with the public, Mr. McLimont has made a complete readjustment of relations between the company and the city. Jitneys have been abolished, fares increased to seven cents, while negotiations are

now pending between the company and city with a view to effecting a service-at-cost franchise, regarding which the prospects of an early settlement are very bright. The property has been almost completely rehabilitated and the company is again on a paying basis—truly a record of achievement in 3½ years. Mr. McLimont is a native of Quebec, and recognized as one of the leading traction experts on the continent, having had wide experience in many of the biggest cities in the U. S. A.

Cannot Carry Freight

The Montreal Tramways Company have declined to carry freight, owing to conditions which are not acceptable to the company. The civic administrators and the tramways commission issued separate and contradictory orders, the former insisting that the practice at once cease, and the latter instructing the company to continue carrying freight. This resulted in a deadlock and the company took the position that as the conditions sought to be imposed by the civic administrators were unreasonable, the company would discontinue carrying freight, leaving it to the city to take the responsibility of the situation.

The Administrative Commissioners objected to the order of the Tramways Commission on the ground that it was contrary to the contract between the city of Montreal and the company. The objection to carrying freight is that it had been carried on without regulation, was a source of danger to the traffic, and caused damage to the streets.

Favors Electric Operation

Mr. D. M. Morrison, chief engineer of the London and Port Stanley Railway, addressing the Rotarians of London, Ontario, at a recent luncheon, is reported to have stated that superior financial and operating advantages, together with the coal problem, would eventually compel the electrification of Canadian railways. He pointed out that the electric locomotive is available for work 24 hours a day, seven days a week; that 30 per cent. more freight could be hauled over an electric road than on a steam line; that electric operation has reduced the operating time of railways 24 per cent. on this continent, and that maintenance-of-way charges are cut 50 per cent. where electric locomotives are used.

Hull Tries Safety Car

The one-man safety car is shortly to be given a trial by the Hull Electric Company, when one of the most up-to-date cars of this type will be placed on the regular service. Mr. G. Gordon Gale, vice-president and general manager of the company, is a strong believer in the lightweight safety car. It is his opinion that the development of safety devices has made one-man operation not only possible, but safer than the present standard two-man operation in congested city traffic.

Skip Stop Savings

The British Columbia Electric Railway Company of Vancouver, B.C., is inaugurating the skip stop. It has already been placed in operation on the Kerrisdale line, Vancouver, and public opinion is being canvassed as regards its general adoption. So far 95 per cent. of the communications have been favorable.

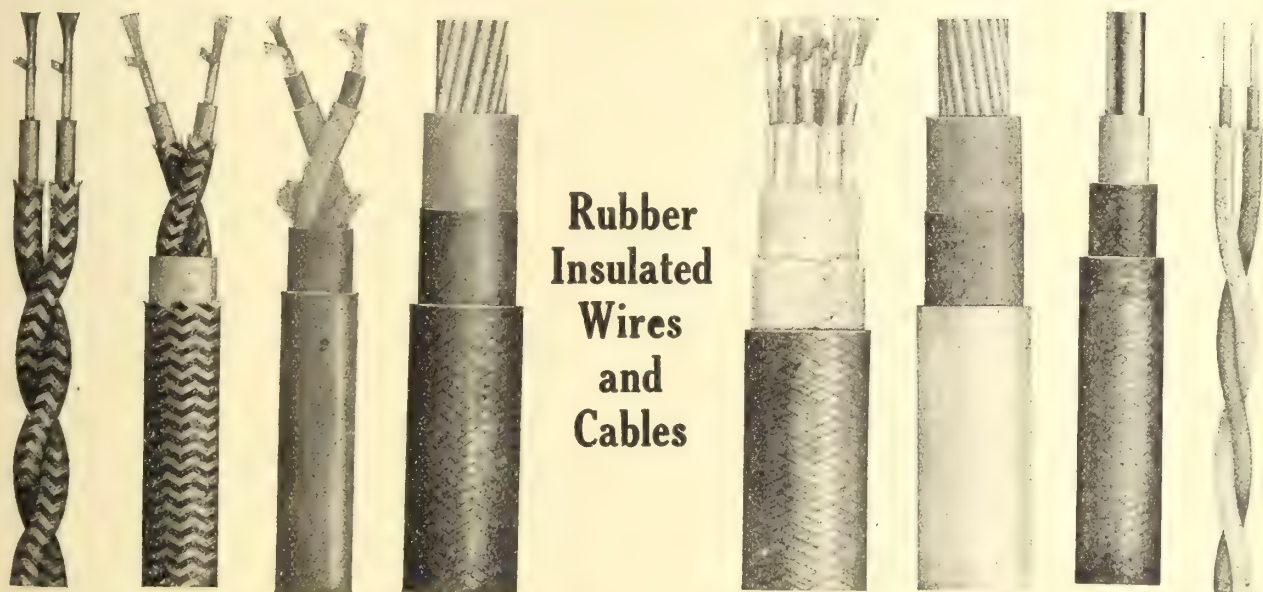
Mr. Weyman Addresses Rotarians

Mr. H. F. Weyman, manager of the Lewis County Railway Company, recently addressed the Rotary Club of Quebec City on the "Development of Electric Power and Railways in the Province of Quebec."

WIRES AND CABLES

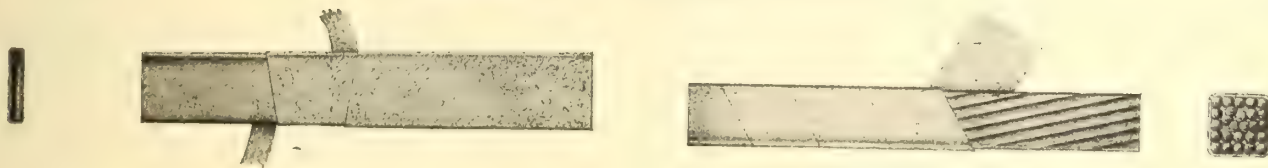
Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889

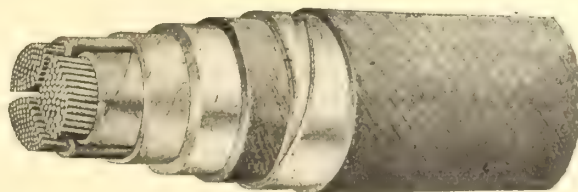


Rubber
Insulated
Wires
and
Cables

Magnet Wires and Cables



Power Cables



Weatherproof Wire
Cadmium-Copper Wire

Telephone Cables

Trolley Wire
Enamelled Wire

Head Office and Factory

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MONTREAL

Current News and Notes

Chatham, Ont.

A large deputation from Kent County Council waited recently on Premier Drury, urging that the Chatham, Wallaceburg & Lake Erie Railway, now owned and operated by the Mackenzie & Mann interests, be taken over by the Ontario Hydro-electric Commission.

Fordwich, Ont.

Ratepayers recently carried a Hydro-electric debenture by-law by 57 to 19. The village of Gorrie also carried a similar by-law by 76 to nothing. The amount involved in each case is \$12,000. Power will cost Fordwich \$93 and Gorrie \$69 per horse-power.

Guelph, Ont.

Operation and management of the Guelph Street Railway was turned over to the Ontario Hydro-electric Power Commission for a term of 50 years at a special session of the city council recently when the by-law providing for this move was given its third reading.

Handel, Sask.

Tenders will be received by the Handel Rural Telephone Co. for an extension to their present system. Plans with Department of Telephones, Regina, Sask.

Montreal, Que.

The Public Service Corporation of Quebec have issued their annual report for the year ending December 31st, 1920. Despite unfavorable conditions prevailing in the field which it serves, the gross income of the company for the year amounted to \$305,627, an increase of \$42,222 over 1919. After deductions for operating and general expenses, but before bond interest was allowed for, the net earnings for the year were \$116,557, against \$102,000 for the preceding year. After allowing \$25,000 for bond interest, the balance applicable to the \$1,600,000 outstanding capital stock of the enterprise amounted to \$91,557, or the equivalent of 5.72 per cent. on the securities, against \$77,862, or 4.87 per cent. in the previous year.

Mr. O. Tardif, 2550 Ontario Street East, Montreal, has been awarded the contract for electrical work on \$50,000 bank and apartments being erected by the Bank of Hochelaga.

Mr. W. Roy, 595 Centre Street, Montreal, has been awarded the contract for electrical work on two \$6,000 residences being erected on Belgrave Avenue.

Messrs. Vallee & Hamelin, 1867 St. James Street, Montreal, have been awarded the contract for electrical work on \$60,000 Roman Catholic school being erected at Baldmere and Tellier Streets, Montreal.

The Marchand Electrical Company, 55 Cote Street, Montreal, has been awarded the contract for electrical work on \$150,000 alterations to warehouse of the Salada Tea Co., Ltd.

Mr. H. R. Cassidy, 255 Regent Avenue, Montreal, has been awarded the contract for electrical work on \$60,000 warehouse being erected on Duke Street, Montreal, for Mr. R. W. Bertram.

The Sawyer Electric Company, 87 Bleury Street, Montreal, has been awarded the contract for electrical work on \$110,000 alterations to office building at 502 St. Catherine Street East, owned by the City & District Savings Bank.

Ottawa, Ont.

Tenders will be called shortly for electrical work on \$300,000 branch of the Canadian Bank of Commerce to be

erected on Sparks Street, Ottawa. Architects, Darling & Pearson, 2 Leader Lane, Toronto.

Port Arthur, Ont.

The Hon. Harry Mills, Minister of Mines, has been asked by the cities of Port Arthur and Fort William to sponsor a bill empowering the cities to charge a seven cent fare on the street railway. This action is being opposed by the Fort William Trades and Labor Council.

St. Catharines, Ont.

The Clifford Electric Co., 21 Ontario Street, St. Catharines, has been awarded the contract for electrical work on \$14,000 residence being erected on Adam Street for Mr. A. E. Jencks. Also for residence being erected on Catharines Street for Mr. W. D. Mills.

Sarnia, Ont.

The Smith Electric Company, Front Street, Sarnia, has been awarded the contract for electrical work on \$50,000 apartment house being erected at Cromwell & Brock Streets for Messrs. Revely & MacDonald.

Simcoe, Ont.

Estimates will be received by the Simcoe County Council on electric wiring and fixtures for the local court house. Mr. A. Jacques, chairman.

Toronto, Ont.

Messrs. Porter & Company, 2 Toronto Street, Toronto, have been awarded the contract for electrical work on Infirmary Building being erected at Davenport & Ossington Avenues for the Ontario Odd Fellows' Home.

The Bishop Electric Company, 745 Broadview Avenue, Toronto, has been awarded the contract for electrical work on store being erected at 23 Danforth Avenue for Caruso Bros.

The Ontario Gazette announces the incorporation of the Gillespie Eden Corporation, Ltd., with head office at Toronto, for the purpose of manufacturing and dealing in electrical appliances and fixtures. The company is capitalized at \$40,000.

The Automatic Telephone & Time Recorders, Ltd., 140 Victoria Street, Toronto, has been awarded the contract for telephone installation in 18 suite apartment house being erected on Cumberland Street. Stromberg-Carlson equipment will be used.

Mr. R. Balment, 71 Westlake Avenue, Toronto, has been awarded the contract for electrical work on \$12,000 store and apartments being erected at Morley & Applegrove Avenues, Toronto.

Messrs. Smith & Hawk, 254 Cedarvale Avenue, Toronto, have been awarded the contract for electrical work on two \$5,000 residences being erected on Newmarket Avenue for Mr. J. A. Thomas, 101 Chisholm Ave, Toronto.

Upon a suggestion, which is attributed to Sir Adam Beck, the Hydro-electric Power Commission of Ontario recently passed a resolution which will permit all blind persons to travel free of charge upon hydro-radials in Ontario. The idea has been passed along to the Toronto Transportation Commission with the suggestion that it be adopted by the Toronto system when it is taken over next September. Sir Adam Beck is said to have conceived the idea when in Paris recently, where he saw many sightless French war veterans being carried free by the French transportation companies.



Hydro-Electric Power Commission of Ontario

ELECTRICAL INSPECTION DEPARTMENT

Kindly take notice that on and after June 1st, 1921, approved outlet boxes must be installed at all outlets in concealed knob and tube work, as required in Paragraph 8, Section "B", Rule "e", Page 68 of the 6th Edition of the Rules and Regulations.

This rule refers chiefly to new houses or other buildings where the walls and ceilings are to be lath and plastered or covered by other building materials, in which knob and tube wiring is installed.

The use of approved outlet boxes, whether deep or shallow, will be permitted.

This ruling will eliminate to a large extent the use of angle boards, which are at present installed for the purpose of holding the flexible tubing in place, and in lieu thereof approved devices, fittings or loom clips will be required for this purpose. This will also apply to flexible tubing entering switch, receptacle, or other boxes, or wall cases.

The enforcement of the rule requiring outlet boxes will not apply to old houses which may be wired, nor would it be necessary to install outlet boxes on the verandahs or at the basement outlets of new houses unless the ceilings of same are to be lathed and plastered.

A. G. HALL,
Chief Electrical Inspector.

VERMONT ELECTRICAL SLATE

FOR SWITCHBOARDS,
PANELBOARDS, LIN-
ERS, ETC., IN PLAIN
AND MARBLE FINISH

*Get in touch with
us for prices and
full information.*

HYDEVILLE SLATE WORKS
HYDEVILLE, VERMONT, U. S. A.



The electrical merchant is offered a splendid selling proposition in the BAETZ line of Portable Electric Lamps and Silk Lamp Shades.

Many attractive designs to choose from. Prices right. Shipments prompt.

Baetz Bros. Specialty Co.
Limited
Kitchener - Ontario



ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1.
Walter Clinton, Welland, Ont. 22-7

For Sale

450 kv.a. Hydro Electric Equipment.
One new C.G.E. 450 kv.a., 400 r.p.m., 6,600-volt water wheel type generator.

One exciter for above.

One new double runner S. Morgan Smith unit, 37 feet head for direct connection to above.
Switchboard complete.

This equipment will be sold in whole or part. The hydraulic equipment is at York, Pa., and the electrical equipment is at Peterboro, Canada.

The Nova Scotia Power Commission,
5-8 Halifax, N. S.

Reliable Manufacturers. Agents in Vancouver are desirous of adding some strong agencies for electrical equipment or specialties to their list. We would like to hear from any manufacturer who is desirous of placing his product in British Columbia. Electrical News, Box 88, 212 Winch Bldg., Vancouver. 3-6

Motors for Sale

Large stock of 25 cycle and 60 cycle Motors, consisting of Westinghouse, Crocker-Wheeler and C. G. E. makes. Motors purchased from American Government and have seen little or no use. Attractive prices.

Apply—L. S. Tarshis & Sons,
400 Front St. East,
2 Toronto, Ont.

For Sale

Slightly used battery charging sets (motor generator type) 110 volts, 25 cycle motor to 30 volt generator at \$100 set.

LEFF ELECTRIC CO.,
316 Grey St.,
5 London, Ont.

For Sale

Sash, door and planing mill machinery, boilers, engines, motors, pulleys, gears, machine shop & moulding machinery, 8 ft. Linderman glue jointer. Full printed list on request to Cargill Limited, Cargill, Ontario. 5-8

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-t.f.

It is widely recognized that a more general installation of baseboard and other convenience outlets in homes and other buildings would be of mutual advantage to the electrical industry and to the general public. The use of such outlets is handicapped, however, by a condition which central stations, if they would, could do much to overcome.

The use of lamp base type receptacles

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

Wanted Position of Responsibility by Competent Electrician. 20 years practical experience in light, heat and power. Capable of taking full charge. First class credentials. Will go anywhere. Write Box 501, Electrical News, Toronto. 5-6

WANTED—SUPERINTENDENT for Tillsonburg Hydro-electric system; state experience and salary required; applicants received up to March 5. Apply to C. H. Denton Co., Chairman of Hydro Commission, Tillsonburg, Ont. 5

ELECTRICAL SUPPLY SALESMAN:—We have one or two openings for experienced electrical supply salesman, city and out of town work. If you can qualify, apply to S. W. Smith, Electrical Equipment Co., Ltd., 454 St. James St., Montreal, Que. 5

WANTED SUPERINTENDENT to take charge of maintenance of 16,000 Horse Power hydro-electric generating station. Must be experienced man. Applicants kindly give experience and salary expected. Apply Northern Canada Power, Limited, Drawer "A", Timmins, Ontario. 5

A manufacturer of fuses in the United States with a Canadian office, would like to get in touch with an experienced salesman of energy and ability. Excellent opportunity for future advancement. Answer giving full information regarding age, experience and references. Apply Box 505, Electrical News, Toronto. 5

Wanted

Hydro-electric power plant operators for East and West Canada. Actual experience operating hydro-electric plants essential. Write giving full particulars, age, experience, salary expected, nationality, etc. Box 516, Electrical News, Toronto. 5

in baseboards and other easily reached locations, is open to the objection that children, or others, can easily insert their fingers in such a way as to receive a shock. It is also comparatively easy for accidental short circuits to be caused.

If all appliances were equipped with separable plugs, receptacles of the lamp base type would not be necessary, and one of the handicaps to the wider use of convenience outlets would be removed. Appliances equipped with separable plugs can be connected to lamp sockets when required just as readily, if not more so, than appliances provided with solid, or swivel plugs. At the same time, convenience outlets for attaching such devices can be provided with receptacles of the slotted base type, which are much safer from accidental contact, as well as much more convenient to use.

The manufacturers of many devices have already adopted the separable plug as a standard, but others have not done so. It will undoubtedly hasten the time when separable plugs will be universally

employed in the merchandising departments if central stations in purchasing portable lamps or other devices will specify that these devices must be provided with separable plugs. It will also help to bring about this desirable end quickly, if the merchandising departments of central stations urge the various dealers in the districts which they serve to adopt this same policy of specifying separable plugs.—Wiring Committee, N.E.L.A.

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	75	3	25	550	480	Westg.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	60	550	600	C.G.E.
"	1	50	3	60	550	970	Westg.
"	2	50	3	25	550	720	Westg.
New	2	35	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	Tor. & Hm.
"	2	30	3	25	550	720	Westg.
"	1	25	3	60	220	720	Cr. Wh.
"	1	15	3	25	550	1450	Westg.
New	1	15	3	25	550	1400	Lanc.
"	1	15	3	25	550	750	Lincoln
"	6	15	3	25	550	720	Westg.
"	2	10	3	25	550	720	Westg.
Used	1	7 1/2	3	25	220	1500	Tor. & Hm.
"	1	7 1/2	3	25	550	1450	C.G.E.
"	1	7 1/2	3	25	550	700	Lanc.
New	1	7 1/2	3	25	550	725	Westg.
"	1	5	3	25	550	1440	Excelsior
"	1	5	3	25	550	710	Wagner
Used	1	5	3	60	200	1120	Westg.
New	3	3	3	25	550	1500	Lanc.
"	5	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
"	2	2	3	25	550	1440	Excelsior
"	2	2	3	25	550	1425	Lanc.
"	2	2	3	25	550	1500	Lanc.
"	3	2	1	25	110	1440	Wagner
"	1	1 1/2	1	25	110	1440	Wagner
"	1	1 1/2	1	25	110	1420	Wagner
Used	1	1	3	25	220	1500	Tor. & Hm.
New	1	1	1	25	110	1440	Wagner
"	1	1	3	25	550	1425	Lanc.

Write for Prices

H. W. PETRIE, Limited

131 Front St. West - Toronto Ont

If You Want to Know

what that excavation is for, or who is building on that corner lot, or when the tenders for interior work or fixtures should be sent in—You can get the information from MacLean Building Reports. They will bring you—up-to-date, every morning—all the news of

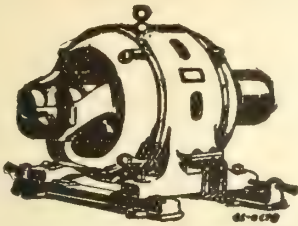
Building and Engineering

Contracts, both contemplated and in course of completion. Our subscribers can get all available information regarding plans, specifications, dates for tenders, or other data through our service. MacLean Building Reports provide reliable advance information, the prompt use of which cannot fail to boost sales.

Write for full information.

MacLean Building Reports Limited

345 Adelaide St. W. - TORONTO
119 Board of Trade Bldg. - MONTREAL
348 Main St. - WINNIPEG
212 Winch Bldg. - VANCOUVER



Machines In Our Montreal Stock

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new "Kuhlman" Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately three to four weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.
1—300 H.P. 300 RPM. Slip Ring
2—300 H.P. 490 RPM.
1—100 H.P. 600 RPM.
2—75 H.P. 1200 RPM.

3 Phase 60 Cycle 550 Volt.
2—200 H.P. 600 RPM. Slip Ring.
1—100 H.P. 600 RPM. Slip Ring.
1—100 H.P. 600 RPM.
2—75 H.P. 900 RPM.
1—50 H.P. 900 RPM. Slip Ring.
4—50 H.P. 900 RPM.
3—50 H.P. 1200 RPM.
2—40 H.P. 1200 RPM.
4—35 H.P. 1200 RPM.
4—35 H.P. 900 RPM.
1—35 H.P. 600 RPM.
3—30 H.P. 1200 RPM.
2—30 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—25 H.P. 1200 RPM.
1—20 H.P. 900 RPM.
2—15 H.P. 900 RPM.
1—15 H.P. 1200 RPM.
1—10 H.P. 1800 RPM.
2—10 H.P. 1200 RPM.
3—10 H.P. 720 RPM.
1—8 H.P. 810 RPM. Crane
2—7½ H.P. 900 RPM.
7—7½ H.P. 1200 RPM.
2—7½ H.P. 1800 RPM.
2—5 H.P. 900 RPM.

14—5 H.P. 1800 RPM.
1—4 H.P. 1140 RPM. Crane
22—3 H.P. 1800 RPM.
12—3 H.P. 1200 RPM.
15—2 H.P. 1800 RPM.
14—2 H.P. 1200 RPM.

3 Phase 60 Cycle 440 Volt
2—50 H.P. 900 RPM.
8—30 H.P. 900 RPM.
2—30 H.P. 850 RPM.

Single Phase 30 Cycle 110/220 Volt
1—1/8 H.P. 1415 RPM.
2—1/6 H.P. 1750 RPM.
1—1/2 H.P. 1420 RPM.

3 Phase 60 Cycle 220 Volt.
1—75 H.P. 900 RPM.
1—60 H.P. 900 RPM.
2—50 H.P. 900 RPM.
2—40 H.P. 900 RPM.
1—30 H.P. 1200 RPM.
1—25 H.P. 900 RPM.
1—20 H.P. 1200 RPM.
1—15 H.P. 1200 RPM.
1—15 H.P. 1150 RPM. Slip Ring
3—10 H.P. 1800 RPM.
2—7½ H.P. 1750 RPM.
3—7½ H.P. 1200 RPM.
2—5 H.P. 900 RPM.
5—5 H.P. 1200 RPM.
2—3 H.P. 1200 RPM.
1—2 H.P. 1200 RPM.
1—1/2 H.P. 1800 RPM.

Single Phase 60 Cycle 110 Volt.
1—7½ H.P. 1800 RPM.
5—5 H.P. 1800 RPM.
9—3 H.P. 1800 RPM.
13—2 H.P. 1800 RPM.
2—1½ H.P. 1800 RPM.
4—1 H.P. 1800 RPM.
1—3/4 H.P. 1800 RPM.
22—1/2 H.P. 1800 RPM.
13—1/3 H.P. 1800 RPM.
25—1/4 H.P. 1800 RPM.
21—1/6 H.P. 1800 RPM.
2—1/6 H.P. 1200 RPM.
1—1/8 H.P. 1200 RPM.
5—1/8 H.P. 1800 RPM.

D. C. MOTORS & GENERATORS

1—40 H.P. 220 Volts.
1—35 H.P. 220 Volts.
1—17 H.P. 110 Volts.
1—8½ H.P. 125 Volts.
1—8 H.P. 120 Volts.
1—1/4 H.P. 220 Volts.
2—1/6 H.P. 32 Volts.

TRANSFORMERS

1—40 K.V.A. 2200/110 Volts.
1—30 K.V.A. 2200/110 Volts.
2—25 K.V.A. 2200/550 Volts.
2—15 K.V.A. 2200/550 Volts.
5—10 K.V.A. 2200/550 Volts.
4—7½ K.V.A. 2200/550 Volts.
5—5 K.V.A. 2200/550 Volts.
1—3 K.V.A. 2200/550 Volts.
2—6 K.V.A. 2200/110 Volts.

If your requirements are not listed above, kindly communicate with us, as our stock is changing day by day.

Electric Motor and Machinery Co., Limited 417 St. James St., Montreal, Que.
Tel. Main 2177—Main 18. Night Call Rock.3523

Motors in Stock

25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
1 10 hp. C.W. 750 rev., starter, rails, pulley.
1 5 hp. C.W. 1500 rev., starter, rails, pulley.
25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
1 13 hp. Lancash. 750 rev., starter, rails, pulley.
1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
1 20 hp. T.H.E. 1200 rev., pulley rails starter.
1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
3 ½ hp. 1200 rev. clutch type T.H.E.
1 1 hp. 1800 rev. split phase Peerless.
1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
NEW SINGLE PHASE MOTORS in STOCK—REPULSION
2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
SPLIT PHASE
2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
4 ¾ hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited
HAMILTON - ONTARIO

SPECIALS!

3 Phase, 25 cycle, 550 volts,
720 R.P.M.

1—25 H.P. } with oil-immersed starter
1—30 H.P. } \$450.00
1—40 H.P. }

3 Phase, 60 cycle, 220 volts,
1200 R.P.M.

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1—30 H.P. } new winding--guaranteed
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of Canada, Limited**

Consulting Engineers—Electrical Equipment
WINDSOR, ONT. TORONTO, ONT.
25 Royal Bank Bldg. Carlaw Bldg.



Synchronous Motors Available in Canada for Immediate Shipment

1—385/500 K.V.A., 3 phase, 60 cycle, 2300 volt, Canadian General Electric Synchronous Motor, 1,200 RPM. With direct connected Exciter and very complete Switchboard. Brand New, never been used.

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With Exciter and Switchboard. Condition equivalent to new.

1—250/300 K.V.A., 3 phase, 25 cycle, 2,300 volt, Westinghouse Synchronous Motor, 237 RPM. with coupling. Suitable for generator operation. In use four years, in excellent condition.

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Buyers and Sellers of New and Used Machinery
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LINE CONDUCTORS OF
STEEL RE-INFORCED



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Brand New Pull Chain Socket—Featuring— A Smooth Even Pull at Any Angle

Best
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Built
For
Durability
And
Service

No. 5000

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DUNCAN ELECTRICAL CO. Ltd.

MONTREAL, - CANADA

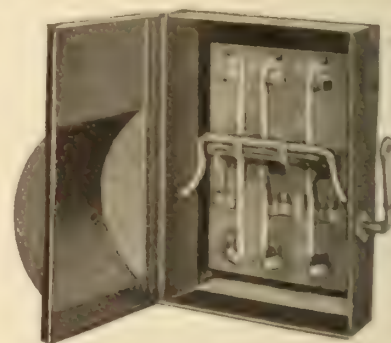
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COCHRANE STEPHENSON & CO., Limited, Winnipeg.

Maritime Representative:

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"DOMINION" Motor STARTING BOXES



Dominion Motor Starting Switches are enclosed in steel cabinets, similar in design to our well known service boxes. Lids are one piece, sheet steel, beautifully formed and absolutely free of wrinkles. Designed especially for frequent starting and stopping of small motors, these switches are heavily constructed of the double throw knife blade type with the running side fused.

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Makers of all types of steel boxes and tanks; also metal stampings, commercial welding and repairing.

DOMINION ELECTRIC SWITCHBOX CO.
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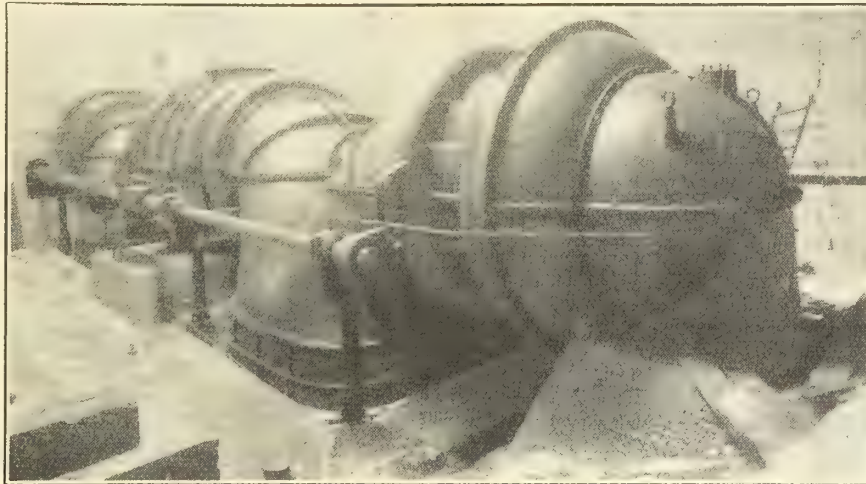
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Service**

The Largest Water Wheel Manufactured in Canada

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A Better Means of Lighting Control

In the Krantz Panel Board all live parts are concealed behind a locked door the key of which is held by the electrician. There is absolutely no danger to even the most inexperienced person in operating the switches.

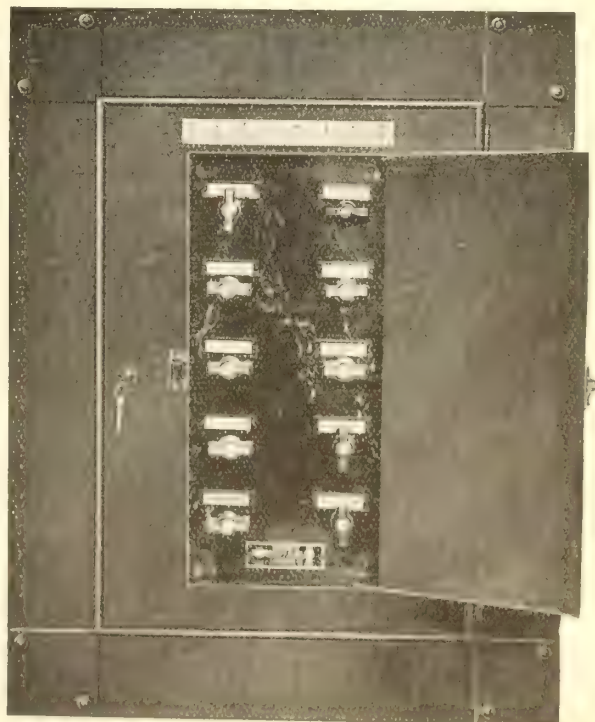
And the Krantz is as efficient as it is simple and safe. It will give steady unfailing service at all times. We guarantee it to do so.

**The Canadian Krantz
Electric and Manufacturing Co.**
95 King St. East, TORONTO

401 New Birks Bldg., Montreal, Que.

402 Vancouver Block, Vancouver, B. C.

703 Confederation Life Bldg., Winnipeg, Man.



Write for Catalogue No. 12-A

MOTORS

3 Phase, 25 Cycle, 550 Volts

- 1—175 H.P., Canadian General, three bearing, slip ring, 750 rev.
- 1—100 H.P., Westinghouse, 480 rev.
- 4—75 H.P., Crocker-Wheeler, 750 rev., new.
- 2—75 H.P., Westinghouse, 750 rev.
- 4—50 H.P., Westinghouse, 750 rev., new, H.S. type.
- 4—50 H.P., Westinghouse, 750 rev.
- 2—40 H.P., Westinghouse, 750 rev.
- 2—30 H.P., Canadian General, 750 rev.
- 4—20 H.P., Westinghouse, 750 rev.

3 Phase, 60 Cycle, 550 Volts

- 1—175 H.P., two bearing, variable speed, Crocker-Wheeler motor, with drum type controller.
- 1—150 H.P., Allis-Chalmers motor, 720 rev.
- 1—125 K.V.A., Allis-Chalmers, synchronous motor, 720 rev.
- 1—112 H.P., Canadian General, variable speed motor connected to single drum mine hoist.
- 1—100 H.P., Canadian General motor, 900 rev.
- 1—75 H.P., Westinghouse motor, 900 rev.
- 1—75 H.P., Canadian General motor, 900 rev.
- 1—50 H.P., Westinghouse motor, 900 rev.
- 2—25 H.P., Westinghouse motor, 900 rev.
- 1—10 H.P., Westinghouse motor, 1200 rev.
- 1—20 H.P., Lincoln motor, 1800 rev., 220 volts.

Motors and Generators in Stock

- 1—30 K.W., 125 volt, Canadian General Electric generator, direct connected to Robb Armstrong engine, 300 rev., complete with switchboard, \$1500.00.
- 1—375 K.W., Westinghouse generator, 3 phase, 60 cycle, 2200 volts.
- 1—150 K.W., Allis-Chalmers generator, 3 phase, 60 cycle, 600 volts, direct connected to Robb Armstrong engine, 1204 rev., complete with switchboard.
- 2—275 K.W., Allis-Chalmers generator, 3 phase, 60 cycle, 2200 volts, direct connected to Bellis & Morcom vertical high speed engine, complete with switchboard.

All motors except high speed are equipped with base and pulley and all have suitable starters equipped with no volt release and are guaranteed to be in first-class condition.

We will refund any money paid on equipment if it is not exactly as represented.

Wilson-McGovern, Ltd. 505-509 Lumsden Bldg., Toronto

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There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

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Date.....19

Please tell me

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A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition which might save your city or town or your client many hundreds of dollars.

Marchand Electrical Works Limited

U. A. Leduc

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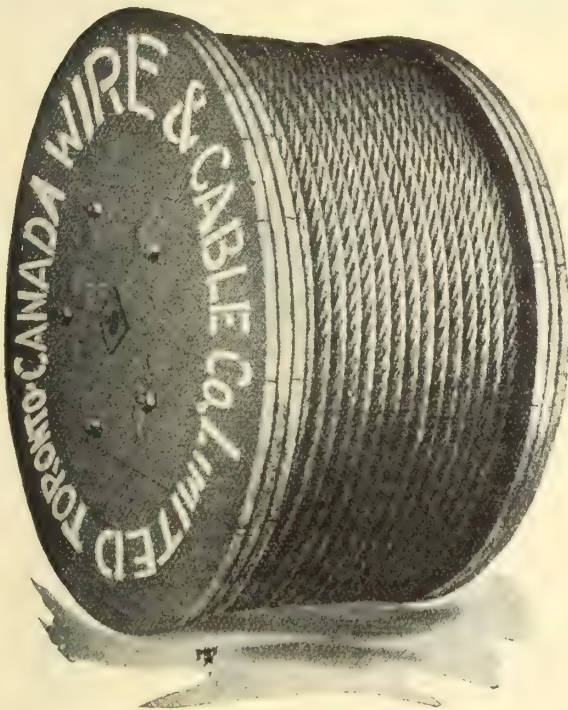
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Repairs to motors, dynamos, transformers, etc. If you plan changes in your motive power, our 20 year's experience is at your disposal.

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Dependable Electrical Wire

Wire built under the direct supervision of experienced engineers.

We make Bare and Insulated wire and cable for every transmission purpose.

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A Battery
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Solicit
Your
Enquiry

Office and Works:

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Has Outlasted 12 Sets of Ordinary Brushes

A big argument in favor of any commodity is its ability to last a long time.

NO - SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

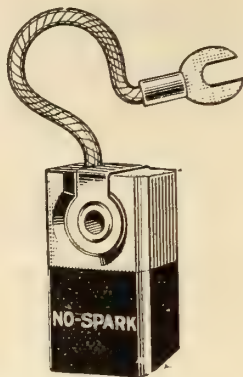
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

Send for our interesting bulletins.

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Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



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is a product of the best of engineering, design, materials and workmanship. Over twenty-five years of transformer building experience is put into every Wagner Transformer. You can make this experience save you money.



Send for Bulletin 11913.



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The only licensed manufacturer in Canada of this well known high grade material is

N. SLATER COMPANY, LTD.

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Made in Canada Under Peirce and Hubbard Patents

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**ARE THE
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**Independent from
the Lamp
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*On Sale at All Good Jobbing
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The longer life of Oshkosh Construction Tools is due to the better materials and workmanship that go into them.

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are produced from finest grade steel and wood, by men long skilled in the work. Before it leaves the plant, each tool is subjected to a triple inspection. It is because these higher standards have always been maintained that more Oshkosh Tools are sold than of all other makes combined.

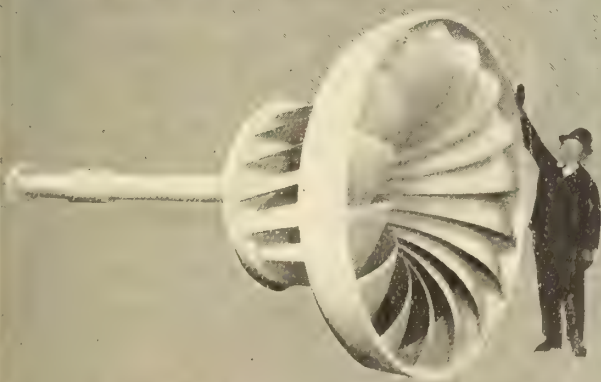
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Type Z Runner for Montreal Cottons, Ltd.

Send for our Bulletin No. 54

WM. HAMILTON CO., LTD.
PETERBORO, - ONT.

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These turbines are built in a plant that has been specializing in high grade, dependable machinery for over sixty years

We guarantee our products in material, design and workmanship, to be the equal of any on the market and to give perfect satisfaction wherever used.

Made in Canada

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DISTRIBUTORS OF

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The Masco Company, Ltd.
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LIGHT INTENSITY

with a minimum of Power

is obtained with the

**Pittsburgh
Show Window
Reflectors**



They will increase the light 400 per cent. to 500 per cent. This has been established by scientific test.

Illustration shows "Pittsburgh" Reflector No. 100 for 100 or 150 Watt Lamp. Dimensions—Height, 8 3/4 inches; Width, 8 3/4 inches. Holder, 2 1/4 in. Form "O."

It will be to your advantage to learn more about the efficiency of these Reflectors. Write to-day for illustrations of the different types of reflectors for show windows and indirect lighting.

**Pittsburgh Reflector and
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PITTSBURGH, PA.

Canadian Distributors

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ARE NOW A
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Frames and rotors in all sizes from 1 to 125 Horse Power are shipped from Cleveland. They are then wound, impregnated, assembled and tested in our new plant in Toronto. Winding data and specifications are furnished by

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The completed motors turned out by us are up to the Lincoln standard in every way. Lincoln engineers fit the power to the work. We will sell you Performance and Service.

Quick Delivery

can be made of slow speed motors
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720 and 600 R.P.M. 60 Cycle
when proper frames are in stock.
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Lincoln Electric Co.

of Canada, Limited

Head Office and Works

136 John St.,

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**"Link up with
Lincoln"**

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Montreal Office
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A Plain Question

What is the Canadian National Newspapers and Periodicals Association?

And a Frank Answer

For many years prior to December, 1919, all the publications in Canada practically were grouped in one Association, known as the Canadian Press Association. In this Association there were three sections, Daily, Weekly, and Trade and Class. A little over a year ago it was mutually agreed by the publishers comprising these three groups that more effective work could be done for and by each section if separate organizations were formed, and, coincident with that decision, there came into being the

Canadian National Newspapers and Periodicals Association

In this Association there are incorporated the following classes of publications:

Agricultural newspapers
Business newspapers
Educational newspapers
Religious newspapers
Technical newspapers and Magazines.

Membership in the Association involves certain obligations. Every paper admitted has subscribed to ten rigid Standards of Practice the purpose of which is to afford ample protection to both the subscriber and the advertiser. Every publisher pledges himself, before he is permitted to enjoy the benefits of membership, to

"Consider first the interests of the subscriber," to

"Work for truth and honesty in all departments," and, among other things, to

List of Members

The publications listed below—all of them members of the Canadian National Newspapers and Periodicals Association—should be given preferential consideration in the planning of an advertising campaign. They embrace mediums which appeal to the consumer (either city or farm dweller), merchant, business executive, purchasing agent, technical man, etc. The combined purchasing power of the readers of these papers is greater than that of the total of all other classes of publications in Canada. The facilities of the office of this Association are at the disposal of any firm planning an advertising campaign. We may be able to give you information that will make your advertising dollar buy better value.

AGRICULTURAL NEWS-PAPERS

Canadian Countryman
 Canadian Poultry Review
 Farmers' Advocate & Home Journal
 Farmers' Advocate and Home Magazine
 Farm and Home
 Farmers' Magazine
 Grain Growers' Guide
 Maritime Farmer and Co-operative Dairyman
 Nor'West Farmer
 Weekly Witness and Canadian Homestead

BUSINESS NEWSPAPERS

Bookseller & Stationer
 Business Review & Maritime Retailer
 Canada Lumberman
 Canadian Finance
 Canadian Furniture World
 Canadian Grocer
 Canadian Hardware Journal
 Canadian Insurance
 Canadian Music Trades Journal
 Canadian Woodworker and Furniture Manufacturer
 The Commercial
 Contract Record & Engineering Review
 Dry Goods Review
 Druggists' Weekly
 Footwear in Canada
 Financial Post
 Hardware & Metal
 Le Prix Courant
 Marketing
 Maritime Merchant
 Men's Wear Review
 Monetary Times
 Motoring

Printer & Publisher
 Phonograph Journal of Canada
 Retail Grocer & Provisioner
 Retail Druggist
 Western Canada Coal Review
 Western Canada Contractor
 Western Lumberman

RELIGIOUS AND EDUCATIONAL NEWSPAPERS

Canadian Churchman
 Catholic Record
 Christian Guardian
 East & West
 Northern Messenger
 Pathfinder
 Pioneer
 Presbyterian Witness
 The School
 Teacher's Monthly

TECHNICAL NEWSPAPERS

Canadian Engineer
 Canadian Foundryman
 Canadian Machinery
 Canadian Manufacturer
 Canadian Railway & Marine World
 Electrical Dealer & Contractor
 Electrical News
 Marine Engineering
 Municipal World
 Power House
 Sanitary Engineer

MAGAZINES

Canadian Forestry Magazine
 Everywoman's World
 La Canadienne
 MacLean's Magazine
 Needlecraft Companion
 Western Home Monthly
 Woman's Century
 World Wide

"Supply advertisers with full information regarding character and extent of circulation."

These are only a few of the conditions which have to be subscribed precedent to admission to the Association, but they will give an idea of the high standard demanded.

There are already embraced in the membership of this Association a very large majority of the reputable and responsible publishers of the newspapers and magazines classed above, and it is believed that within a very short time, practically all that are eligible—all who can conscientiously endorse the Standards of Practice—will have been enrolled in our membership.

Canadian National Newspapers and Periodicals Association
Office - 70 Lombard Street, - Toronto, Canada

"Trade Follows the Light"—

Trade comes to the dealer who installs fixtures that produce most at least cost.

In today's intensive drive for sales the merchant must have that harbinger of success—EFFICIENT LIGHTING. Economy is in his mind too.

The Amelite fulfills every requirement for store lighting—in efficiency, in appearance, in economy.

There are stores in your community that need better lighting. The Amelite will help you win their trade.

Let us send you prices.

Write, telephone or wire.

Consolidated Lamp & Glass Co.
CORAOPOLIS, PA.

R. E. DAVIS, Canadian Representative
113 Wortley Road, LONDON, ONT.

The Amelite

For every store room there is a suitable Amelite. Furnished in four sizes. Adapted to lamps of from 75 watts to 500.



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Labelled under supervision of Underwriters' Laboratories

Made in Canada
Conduit

Electrical Wiring
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For All
Electrical
Installations

Manufactured by
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WALPOLE ARMALAC

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Electrical Insulating Liquids and Compounds

WALPOLE products have been the recognized standard of efficient insulation for electrical apparatus since 1892.

WALPOLE products cover a complete line of Insulating Varnishes and Compounds meeting every requirement of the electrical industry.

Stocks carried by all reputable Electrical Jobbers.

Robertson Chemical Company

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Canadian Representative

H. B. HUTCHINGS, 14 Lincoln Ave, Montreal



The Link-Key Chain Plier

The only practical patented device that will open and close any size links without injury to the finest finish.

It's like an extra man around the shop. Made of pressed steel, nickled.

Let us send you information.

Pat. in Canada April 20, 1920.

Pat. in U. S. A. November 4, 1919.

MAYHEW TOOL COMPANY

WILLIAMSTOWN, Mass., U.S.A.

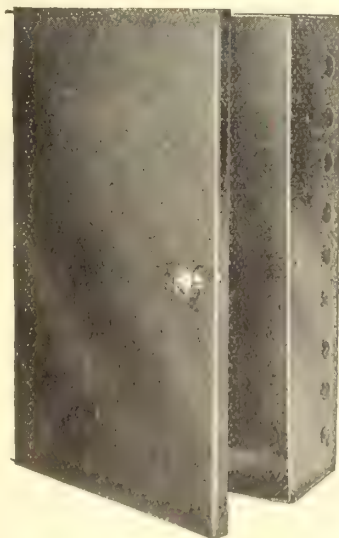
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MADE IN
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We manufacture any size box

Knockouts are easily removed—no hammering the Box out of shape—and painted with a special compound and air dried or baked. The covers lap over on all four sides, making these boxes absolutely rust proof.

Our boxes are sold by all the Leading Supply Dealers.



Hundreds of Contractors are using them. You'll never know how good they are until you try them, and now's the time to do it.

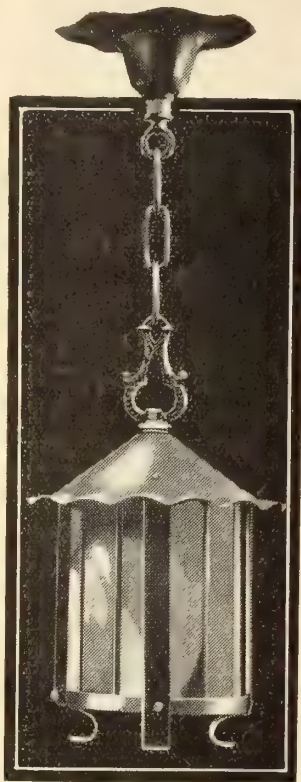
Send us your specifications and we will quote you prices.

Write for Our New Catalogue No. 8

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame St. West

Montreal, Canada



Our New Fixture Catalogue No. 20

is replete with attractive designs and excellent values.

We want every electrical dealer in Canada to receive a copy. If yours has not arrived, kindly drop us a line.

McDonald & Willson, Ltd.

*Designers and Makers of Lighting Fixtures
Distributors Electrical Supplies and Appliances*

Head Office and Showrooms:

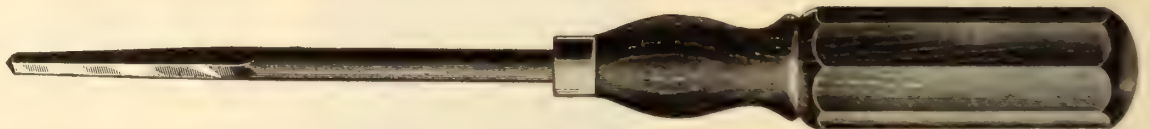
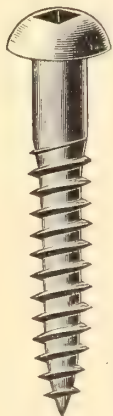
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A GREAT DISCOVERY

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"Why was it not thought of long ago?" is the question that naturally comes to mind when first meeting the Robertson Socket Head Wood Screw.

The reason for its being is plainly evident when one considers its many advantages.

It was originally designed for use in difficult places, such as between joists and narrow openings, etc.

The ordinary slot headed screw requires considerable exertion at times, just to keep the driver on the screw. With the Socket Head Screw the driver cannot slip.

One of the drivers supplied free.

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Seymour

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Sure it does!*

We carry the line

Did you say "Catalogue"?



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"Shurlok" Socket*

in stock in Montreal

Certainly, with pleasure.

Just send your Name and Address, to

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INSPECTION ENGINEERS

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Plans, Specifications, Estimates,
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Manufacturers' Agents & Efficiency Engineers
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Pyrometers, Recording Thermometers, Re-
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The National Journal for the Electrical
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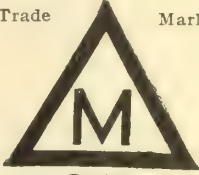
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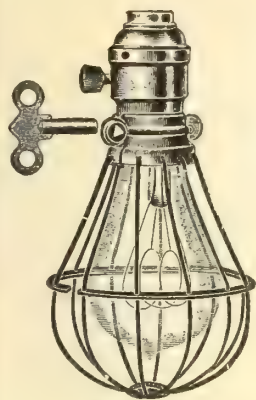
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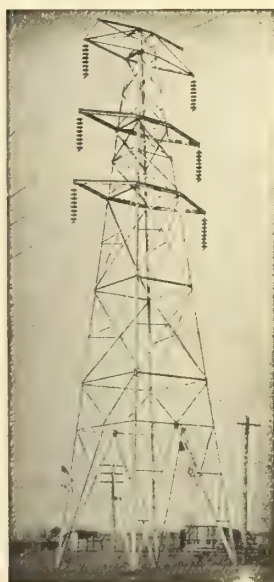
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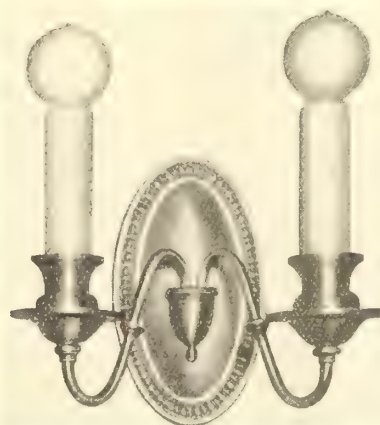
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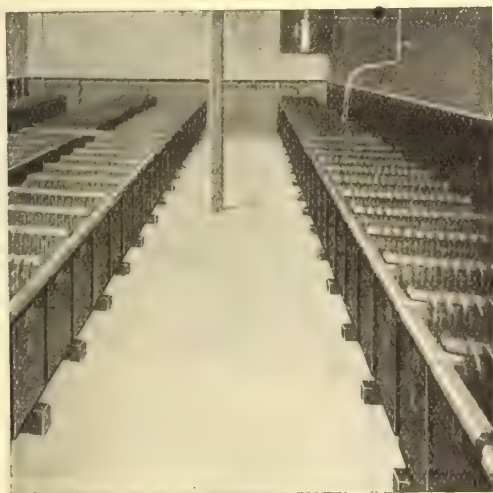
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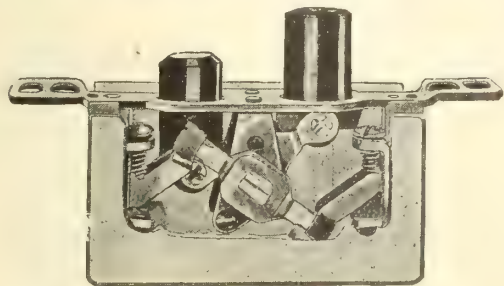
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This is exactly what you, or any one else, will say after having bothered around with loose extension cords.

The Automatic Extension Reel for Electric Lamps

Obviates the necessity of dragging your cord over the floor, thus wearing out insulation and breaking sockets, guards, etc. Takes your light just where you want it, locks at any point, and automatically rewinds your cord when you are through with light. Contains 25 feet of approved reinforced weatherproof cord.

Approved by the Underwriters, and endorsed by fire and electrical bureaus everywhere. Fully protected by two basic patents and more pending. Write for further particulars and prices.

The Cincinnati Specialty Mfg. Co.
Inc.

1907-19 Powers St., West, Cincinnati, Ohio

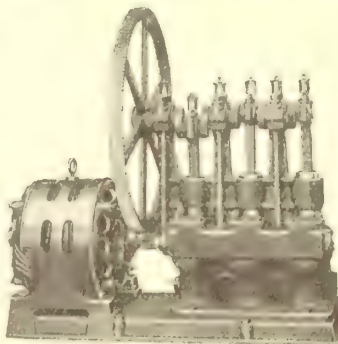
Canadian Agents:
Richard James & Co., Regd., 83 Craig St. W., Montreal, Can.

A Starting Torque of 300% of full load torque is developed by

Century

Repulsion Start-Induction

SINGLE-PHASE MOTORS



which assures the starting of the load, an important factor in all installations.

Ratings
1 10 to 40 h.p.

CENTURY ELECTRIC CO.

19th, Pine to Olive Sts., ST. LOUIS, Mo., U.S.A.

Stock carried in Canada by:

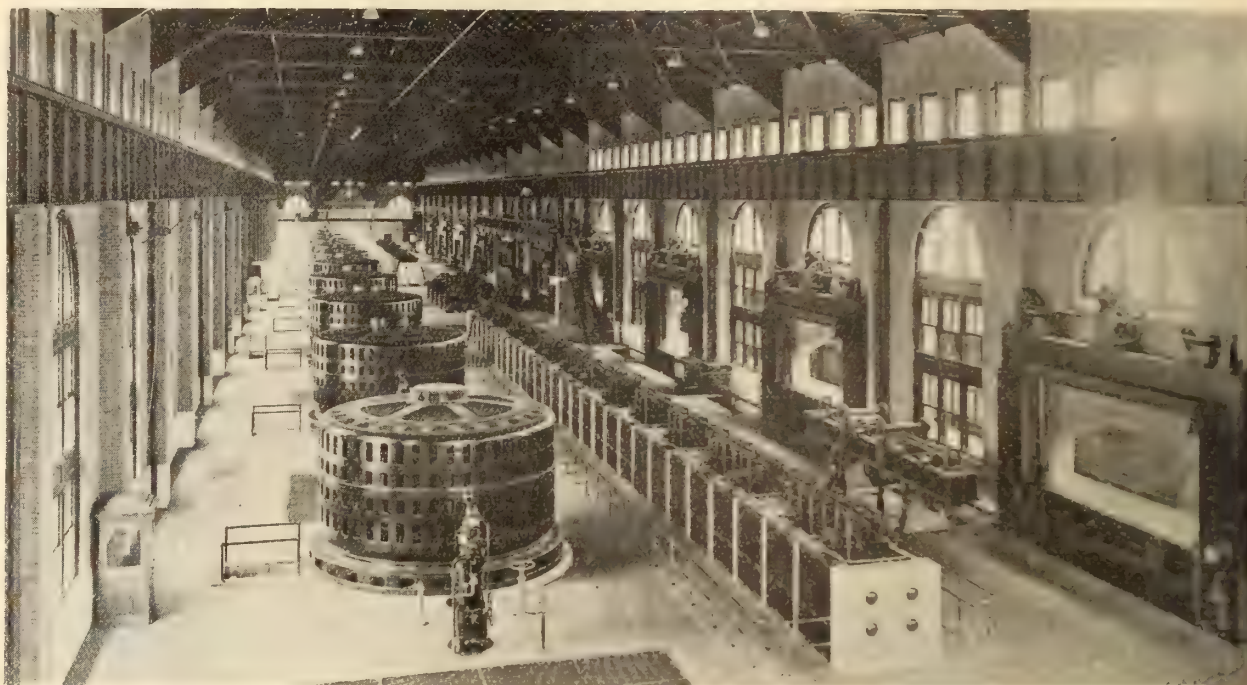
Jones & Moore Electric Co., Ltd., 294 Adelaide St. W., Toronto

Great West Electric Co., Ltd., Winnipeg

Rudel-Belnap Machinery Co., Ltd., 157 Shaughnessy Bldg.,

McGill Street, Montreal

Rankin & Cherrill, 55 Hastings St. W., Vancouver, B.C.



Your Community Depends On An Electric Power Station Like This

- For Light:** to make the factory safer, healthier, and more efficient; to light the dark corners of office, theatre, and store; and to flood the home with cheer.
- For Heat:** to lighten the labor and add to the convenience of the home by means of a multitude of economical electrical appliances; and to improve the speed and quality of baking and drying processes in the factory.
- For Power:** to turn the wheels of industry; to take drudgery from the home, and monotony from the farm; to move the world, if necessary, by the electric motor.
- For Service:** on highway or byway; in home, office, factory, store, and theatre, we are served at the snap of a switch, because the electric light and power company had the foresight to build for the future.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

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 HALIFAX, 105 Hollis St.
 CALGARY, Canada Life Bldg.

MONTREAL—10 St. Sophie Lane
 TORONTO—366 Adelaide St. W

MONTREAL, 285 Beaver Hall Hill.
 FT. WILLIAM, Cuthbertson Block.
 VANCOUVER, Bank of Ottawa Bldg.

Repair Shops are located at
 VANCOUVER—1090 Mainland St.

OTTAWA, Ahearn & Soper, Ltd.
 WINNIPEG, 158 Portage Ave. E.
 EDMONTON, 211 McLeod Bldg.

WINNIPEG—158 Portage Ave. E.
 CALGARY—316 Third Ave. E.



A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

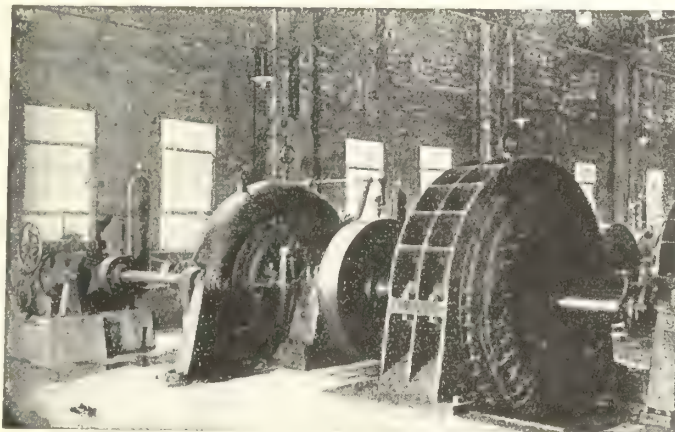
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

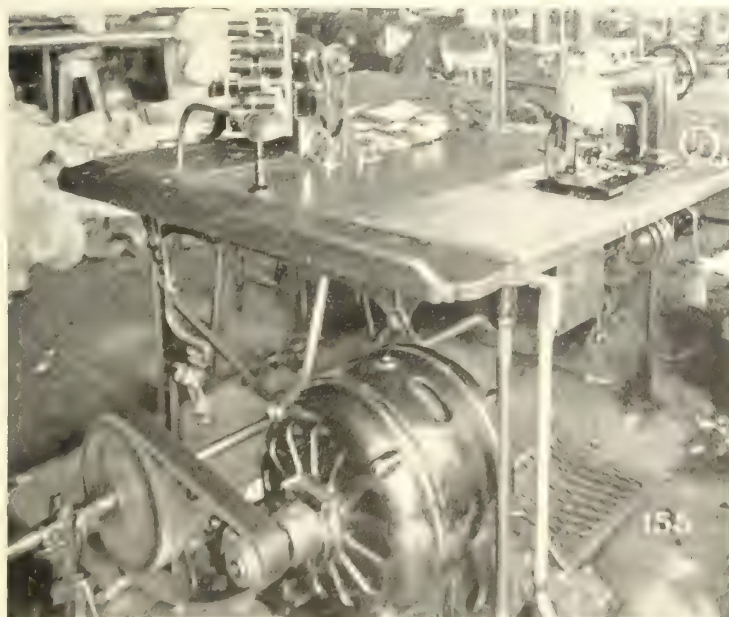
The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
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Morse High Speed Silent Chains



Save Power and Space

*Send Us Your
Transmission
Problems.*

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5 H.P. Morse Chain, Driving Sewing Machine Line Shaft.

USED ELECTRIC MOTORS

IN STOCK FEBRUARY 22nd

550 Volts, 3 Phase, 60 Cycle			
12 H.P.	1800 rpm.	Thomson	
12 "	1800 "	C.G.E.	
12 "	1800 "	Thomson	
12 "	1200 "	Amper	
12 "	1800 "	Thomson	
10 "	1200 "	C.G.E.	
15 "	1200 "	C.G.E.	
15 "	1140 "	Wagner	
25 "	900 "	C.G.E.	
50 "	900 "	A.C.B.	
75 "	900 "	Westg.	
300 "	720 "	Westg.	

A. C. MOTORS			
220 Volts, 3 Phase, 60 Cycle			
3 H.P.	1800 rpm.	A.C.B.	
5 "	1800 "	Watson	
7 1/2 "	1800 "	A.C.B.	
10 "	1150 "	S.G.E.	
10 "	870 "	A.C.B.	
75 "	850 "	Westg.	
75 "	690 "	Westg.	
100 "	720 "	Westg.	

2200 Volts, 3 Phase, 60 Cycle			
50 H.P.	1200 rpm.	A.C.B.	
100 "	720 "	C.G.E.	
200 "	514 "	Crocker	

A. C. GENERATORS

75 K.W. 2300 volt, 3 phase, 60 cycle, 900 rpm., revolving field type C.G.E.
 250 K.W. 250 volt, 3 phase, 60 cycle, 600 rpm., revolving field type C.G.E.

TRANSFORMERS

2-7 1/2 K.V.A. 2200-220/110 60 cycle single phase C.G.E.
 3-15 K.V.A. 2200-550 60 cycle single phase C.G.E.
 2-200 K.V.A. 2200-220/110 60 cycle single phase Packard

D. C. MOTORS AND GENERATORS

110 Volts			
6 K.W.	1850 rpm.	C.G.E.	
6 H.P.	1465 "	Westg.	
8 "	1200 "	Union	
10 "	700 "	G.E.	
11 "	700 "	Westg.	
20 K.W.	850 "	Lundell	

220 Volts			
50 H.P.	950 rpm.	Westg.	
90 "	925 "	Westg.	
100 K.W.	650 "	Bullock	

500 Volts			
5 H.P.	1700 rpm.	Westg.	
5 "	1800 "	C.G.E.	
7 1/2 "	1000 "	C.G.E.	
10 "	1000 "	A.C.B.	
10 "	1400 "	C.G.E.	
20 "	1000 "	Westg.	
50 "	825 "	Westg.	
25 "	950 "	Westg.	
600 "	500 "	Westg.	

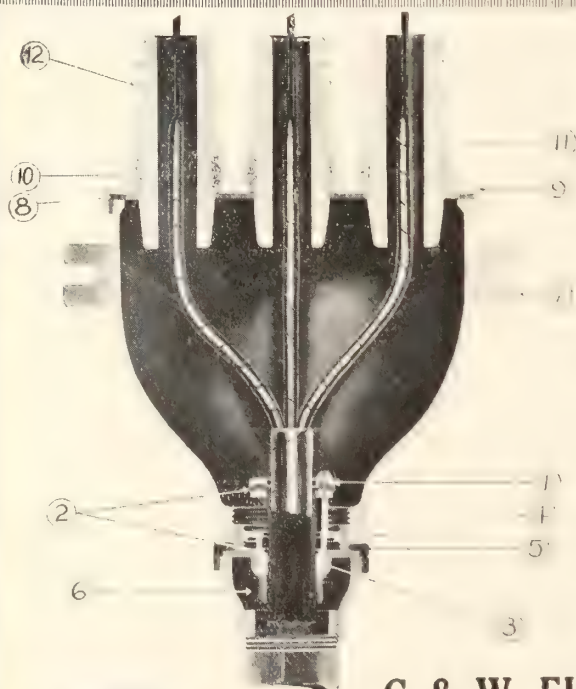
All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

9 ST. GENEVIEVE STREET

MONTREAL



G & W Potheads

1. Dressing and bonding cable sheath without

2. End of lead sheath mechanically belled out at least one and one-half inches in compound. This elevation of complete cable into the

3. Soft packing to prevent leakage of compound compressed by screwed gland.

4. Size of openings standardized and all types of cable entrances (clamped ring, wiping sleeve or plain plug) universal.

5. Universal nut when conduit coupling is desired. All sizes of conduit couplings interchangeable.

Standardized construction with universal fitting enables any shape or size of pothead for upright, horizontal or inverted use. Any pothead can be supplied with bolted cable entrance if turning of bell must be avoided. The most complete standard line for the industry.

7. Installing.
 8. Substantial metal lids. To obtain electric metal is used
 11. porcelain.
 12. porcelain.

G & W ELECTRIC SPECIALTY CO.

7440-52 So. Chicago Ave. CHICAGO, U.S.A.

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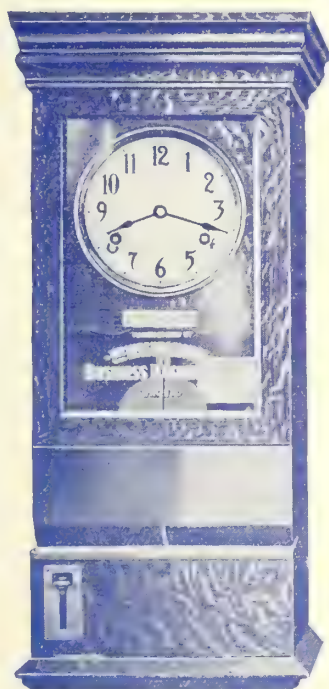


For the Ends of Cables

Electrical

News

Engineering Contracting Merchandising Transportation



International Job Time Recorders

*Systematize the use of
Labor Time for the Great-
est Possible Returns. ∴*

What They Do

SHOW to the minute how much time each worker devotes to each job; tell you the total actual producing time of each worker each day; speed up production by calling attention to delays and all time losses, thus making it possible to remedy them; give you accurate data for cost accounting.

How They Do It

AT start and finish of each job, worker inserts card in slot in the Recorder and presses down lever—it's done in a few seconds. The Time record is clearly printed on the card, the indicator insuring that each record will be placed in right position.

INTERNATIONAL BUSINESS MACHINES CO., LTD.

F. E. MUTTON, Vice-President and General Manager

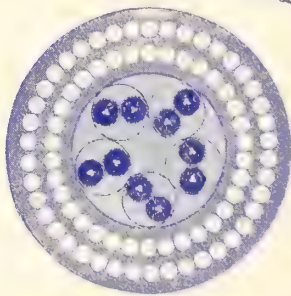
Head Office and Factory, 300-350 Campbell Avenue, Toronto

For your convenience we have Service and Sales Offices in:—Vancouver, Winnipeg, Walkerville, London, Hamilton, Toronto, Ottawa, Montreal, Quebec, Halifax, St. Johns, Nfld.

Also Manufacturers of International Dayton Scales and International Electric Tabulators and Sorters.

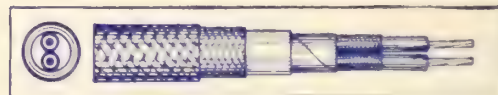
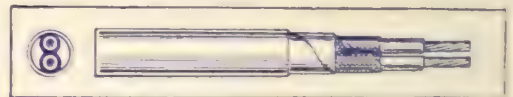


The Smoke Signal
The Primitive Communication
of the North American Indian



Submarine Telephone Cable

The cut above shows the cross-section of a Telephone Cable made for the Bell Telephone Company, and in use under the St. Lawrence river at Quebec. The No. 16 B. & S. conductors are formed of tinned copper strands and are insulated with a superior grade of rubber compound and taped. They are twisted into pairs which are in turn stranded together with jute to form a cylindrical core, the whole protected by two layers of steel wire armor.



Marine Cable

This is a type of cable specially designed for use in conjunction with our Marine Fittings on board ship, on piers or in any other place where the installation may be subjected to damp or harmful fumes. The cable is made up in single or multiple conductors and, in view of the service required, is protected by a lead sheath. This is the outer cover on some cables — on others extra mechanical protection is secured by means of a steel wire braid. Approved by Lloyd's and the Department of Naval Construction.

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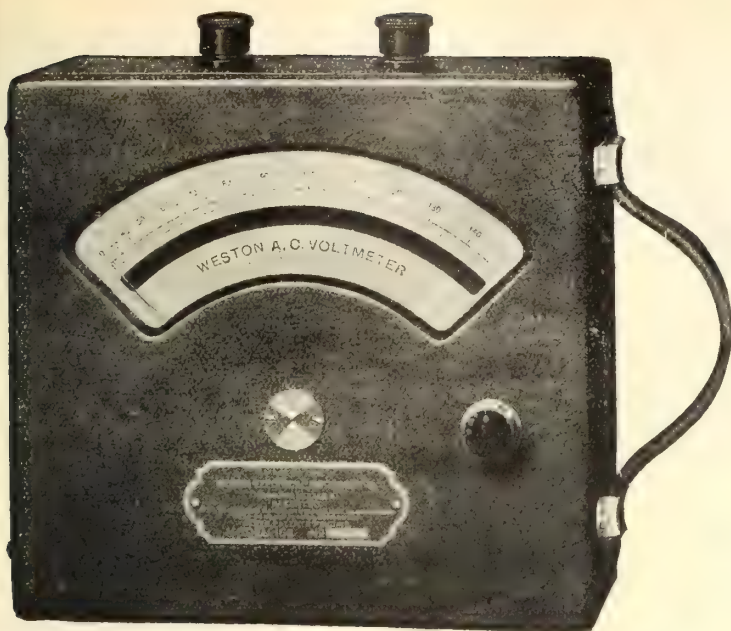
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Do Your Loads
Measure up to
Weston Standards?

Weston Model 155 AC Voltmeter

Weston Model 155 A.C. Voltmeters and Ammeters are ideal, moderate priced, portable testing instruments for taking essential readings so frequently required in an industrial plant to give reliable working data on all equipment under actual service conditions.

The Model 155 maintains the superior Weston Standard of accuracy, workmanship and permanent service. This instrument is of the electro-magnetic principle and is contained in a dust-proof, polished black walnut case with leather carrying handles.

Weston Instruments of similar service characteristics are designed for whatever current conditions you are operating under.

*Our nearest house will gladly furnish detailed information
on any of your instrument requirements.*

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660
Watts

250
Volts

Other McGill Products

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Guards.
Metal Shades.
Portable Lamp
Guards.
Crescent coloring
Fluid.
Crescent Soldering
Paste and Salts.
Waterbury Husks.
Etc.

Pull Sockets

Here is a pull socket that is absolutely abuse-proof. The Universal lever cannot be broken off.

And in this FAUCET OF ELECTRIC SERVICE, you never worry about its carrying the heavy loads of electric heating devices.

The *Lervolier* socket is noted for its smooth, easy pull in any direction.

These three features have made the *Lervolier* famous and have created a big demand for them.

Dealers handling the *Lervolier* have found lively sales, generous profits, satisfied customers and no comebacks.

Let us send you complete data, together with a list of other "McGill Products," or write your jobber. He has them in stock.

McGill Mfg. Co.

Valparaiso

Indiana

MADE IN**CANADA**

BENJAMIN-STARRETT PANEL BOARDS



Those, who in the course of their employment or daily pursuits are or may be called upon to operate switches which control electric circuits, know the feeling of hesitancy which arises where live parts are exposed and extreme care is necessary to avoid contact with metal bars or strips through which electricity passes. This feeling can be eliminated and safety assured with the use of protected panel boards.

BENJAMIN-STARRETT PANEL BOARDS provide the maximum degree of safety. Live bus bars are removed from the front out of the way of the hands, and all live connections may be locked up, leaving the switches free for operation, just as you see in the illustration here.

We would like to send you more information. Write the Advertising Department, 11-17 Charlotte Street, Toronto.

The Benjamin Products logo, consisting of the word "BENJAMIN" in a large, bold, sans-serif font, with the word "PRODUCTS" in a smaller, similar font directly beneath it. The logo is set within a rectangular frame.

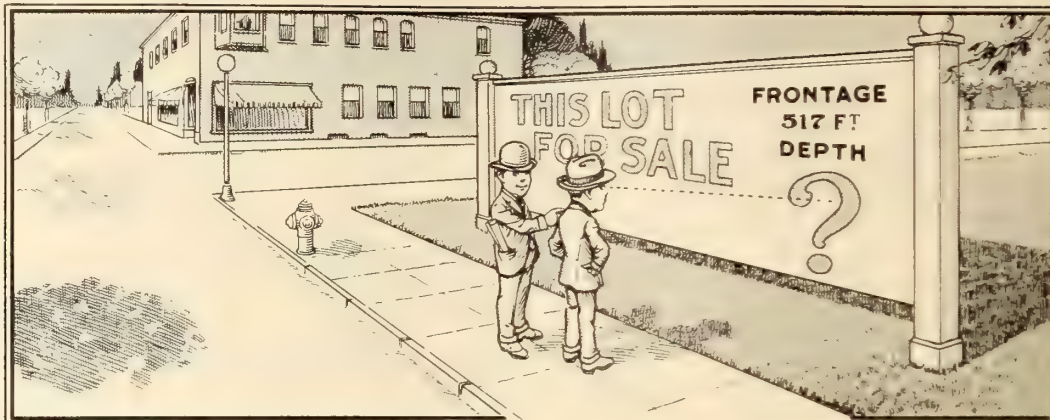
The following are divisions of Benjamin products on which we will be glad to send information:

Industrial Lighting Division
Electrical Division (including Benjamin Two-Way Plug)
Pressed Steel Products Division
Enameled Products Division
Starrett Panel Board Division

Benjamin Electric Mfg. Co. of Canada, Limited
TORONTO

212 McGill Street,
MONTREAL

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Wouldn't YOU Rather Know BOTH the Depth and Length?

If you were buying a lot on which you wanted to build a factory, you would want to **know** the depth of it just as accurate as its frontage. You wouldn't be satisfied if you were told the exact length and an approximate depth.

And if you were buying current, you would be better satisfied if your rates were based on two **measured** quantities, instead of upon one that is accurately measured and one that in many cases is either estimated or neglected altogether.

Lincoln Maximum Demand Meters on the lines of your customers enable you to read maximum demand just as accurately as you now read kw. hour consumption. Your cost of supplying current is divided equitably among your consumers. The customer pays his **just** share of your fixed charges and for his actual kw. hour consumption.

Your customers are better satisfied just as you would be if you were any one of them.

Accurate measurement of demand is inevitable and for two reasons the Lincoln Demand Meter for measuring that demand is just as inevitable—

- 1—Its simple accurate thermo principle.
- 2—The absolute satisfaction it is giving in present installations.

Be among the first to recommend Lincoln Meters to your customers. If you desire further information write us today.

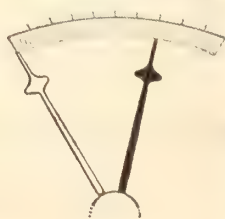
Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

Lincoln
MAXIMUM DEMAND
meter

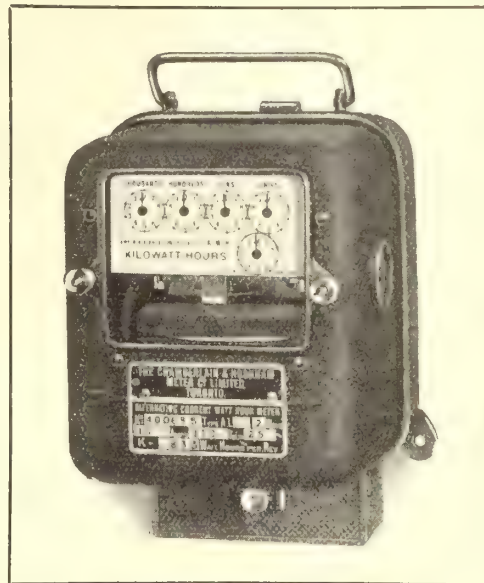


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

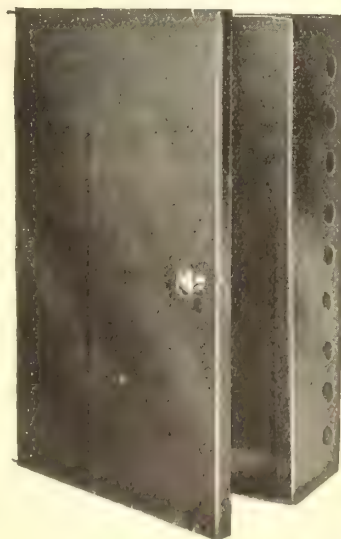
Branches all over the World

DEVOE STEEL BOXES MADE IN CANADA

We manufacture any size box

Knockouts are easily removed—no hammering the Box out of shape—and painted with a special compound and air dried or baked. The covers lap over on all four sides, making these boxes absolutely rust proof.

Our boxes are sold by all the Leading Supply Dealers.



Hundreds of Contractors are using them. You'll never know how good they are until you try them, and now's the time to do it.

Send us your specifications and we will quote you prices.

Write for Our New Catalogue No. 8

THE DEVOE ELECTRIC SWITCH COMPANY

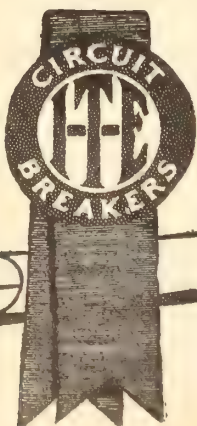
414 Notre Dame St. West Montreal, Canada

We wish to advise our customers that until further notice we shall continue to accept Canadian funds at par, investing the same in Canadian securities.

The Cutter Company

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Toronto, Ont.

Main Office and Factory:
Philadelphia, Pa.



I-T-E
Circuit
Breaker
Engineers



It's a quiet, cool
smooth-running
commutator where
Columbia Pyramid
Brushes are used

Let's Cooperate

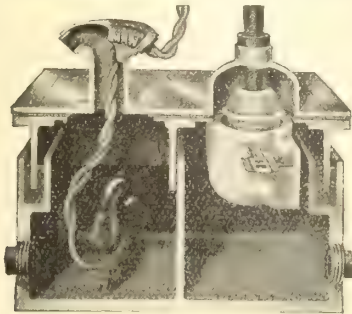
There's one best type of
Columbia Pyramid Brush
for your generator or
motor, whatever its make
—tell us about your ma-
chine, and we'll put on
exactly the brush it needs.

CANADIAN NATIONAL CARBON CO.
LIMITED
TORONTO AND WINNIPEG



Fullman Floor Outlets

Two to Six Sections
ADJUSTABLE COVERS



There is no floor outlet job that the Fullman will not do, better and more economically.

Write for Complete Catalogue.

STEEL CITY ELECTRIC COMPANY
PITTSBURGH, PA.



**Here's
Your
Entire
Auto Fuse
Department**

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment
"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

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Ferranti Meters are made to give a permanent service in constant accuracy.

Their actual record in the electrical field proves that they unfailingly serve the purpose for which they were made. They are specified where only the utmost in efficient accuracy is tolerated.



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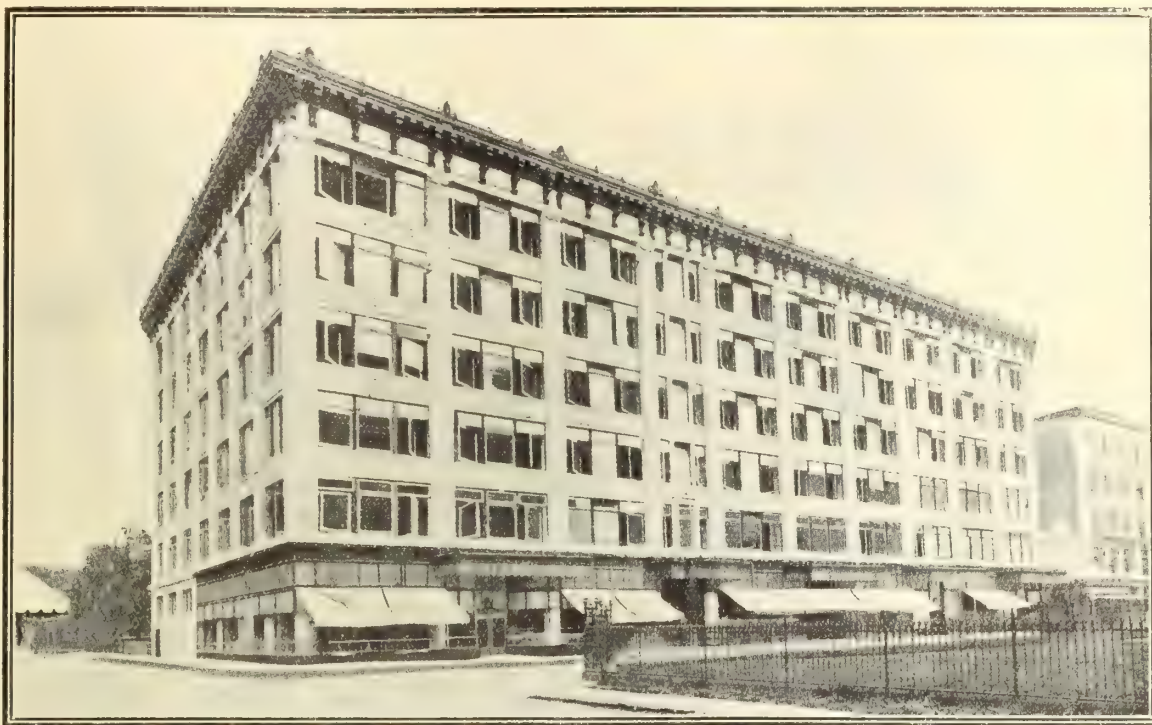
FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.



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“GALVADUCT”

The most perfect interior construction conduit on the market.

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Always specify Galvaduct or
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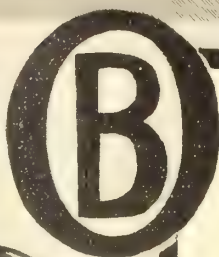
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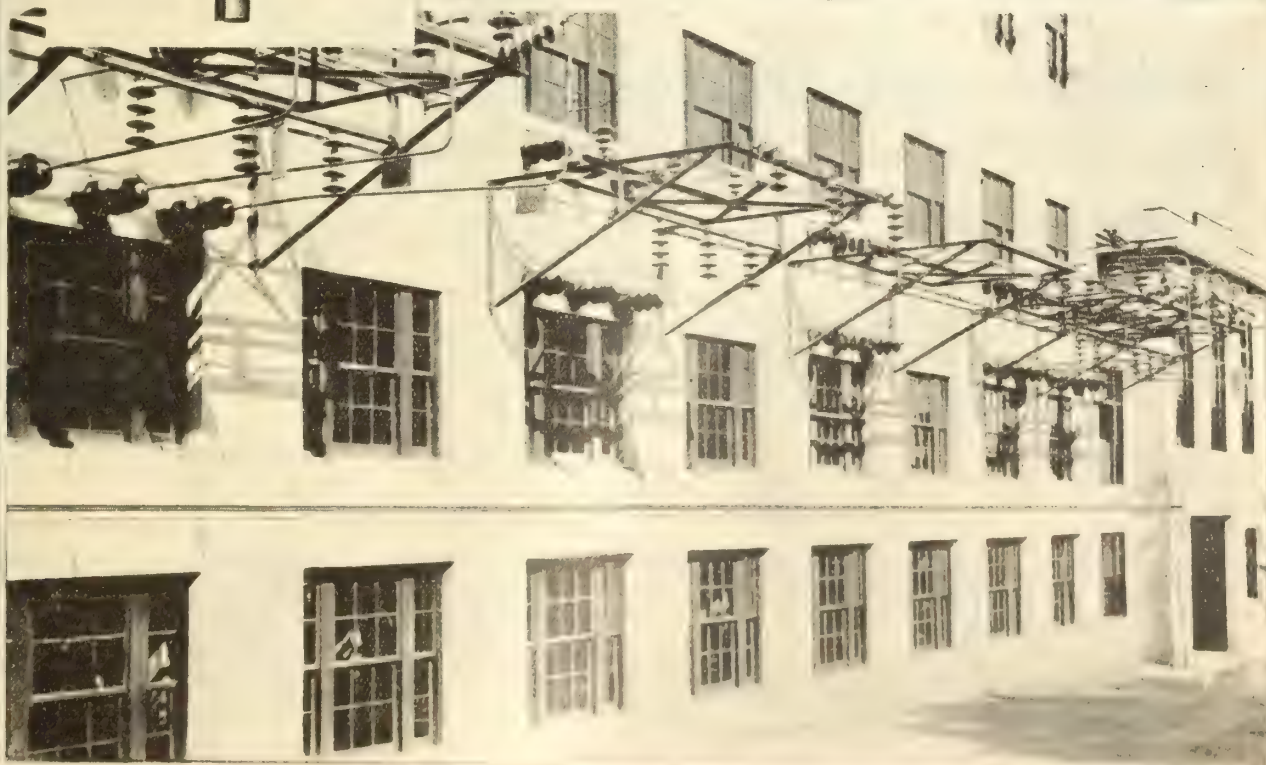
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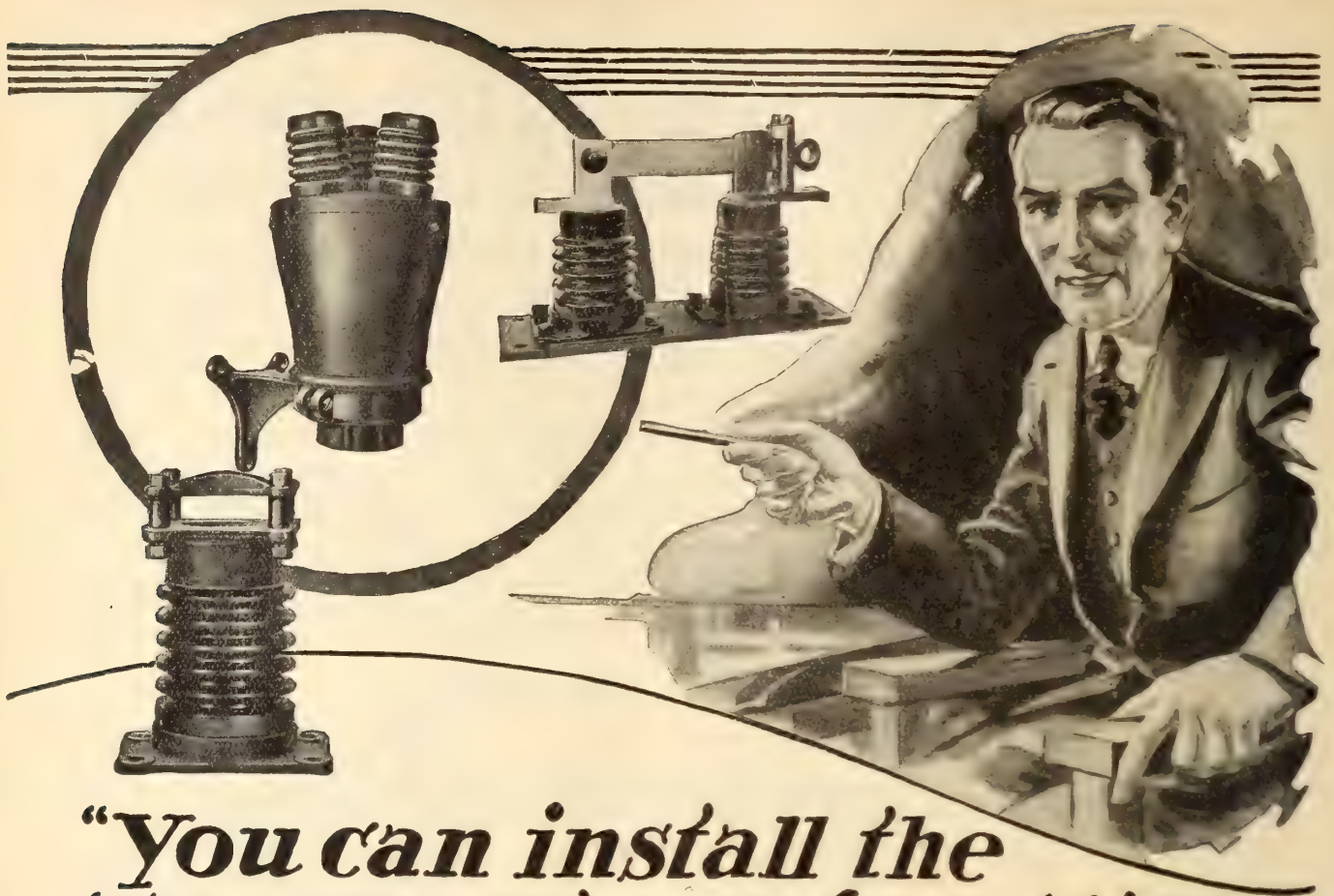
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This article appeared in the March 2nd, 1921, issue of the St. Catharines Standard

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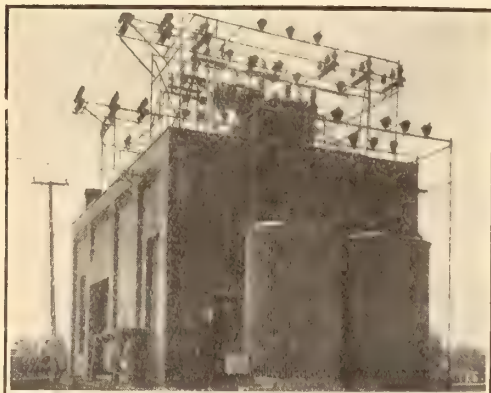
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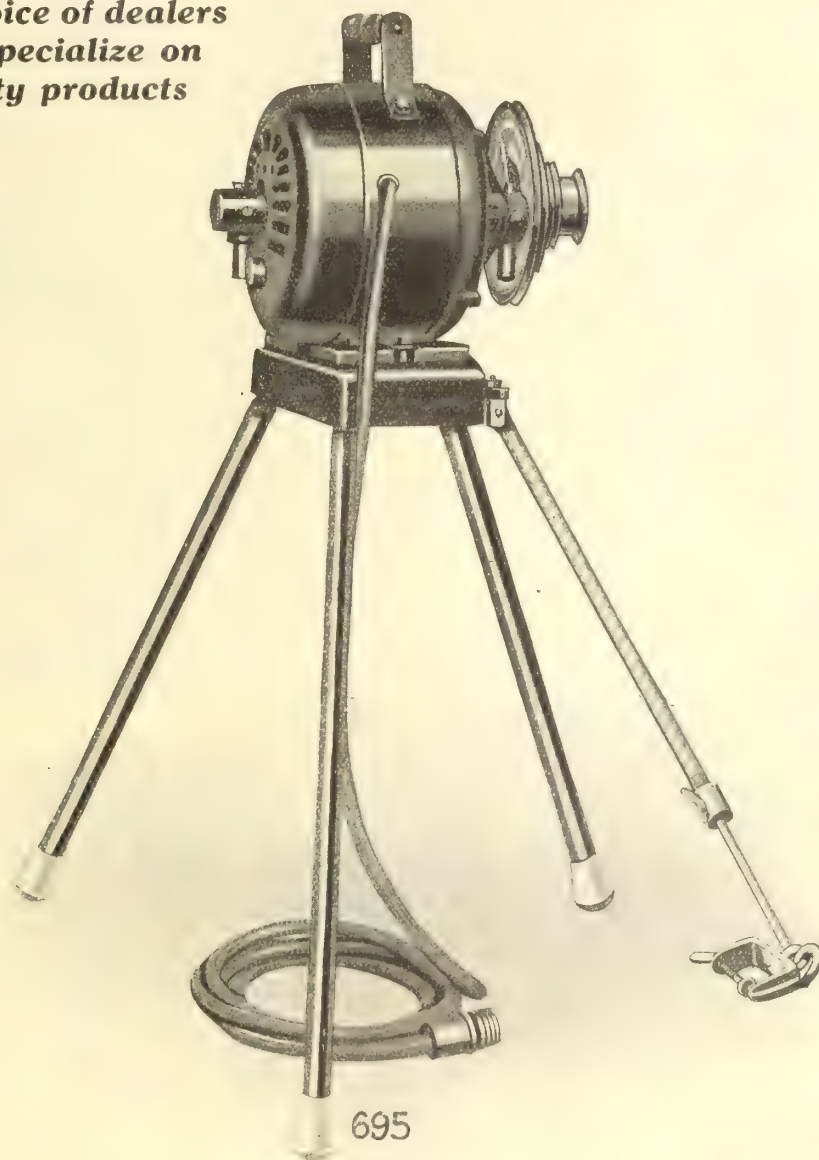
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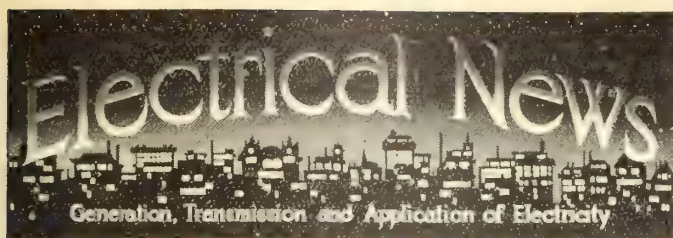
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Vol. 31

Toronto, March 15, 1921

No. 6

Overhead Wires in Montreal Business District To Be Removed

Plans for the work of substituting underground conduits in the place of the present network of overhead wires which disfigures the business district in Montreal, have been submitted to the telegraph, power and light companies affected. Later, these plans will be submitted to the Quebec Public Services Commission by the Conduits Board, and the laying of conduits will begin immediately these are approved.

The cost of the work will be borne by the City of Montreal, which will rent the conduits to the companies owning the cables. The existing overhead equipment will also be bought by the city for re-sale in any market offering.

The district affected is bounded by McGill Street, Notre Dame Street, St. Lawrence Street and the harbor front. Plans to remove all overhead wires in that district were prepared about the time the war broke out, but owing to the high cost of material, and at the request of the affected companies, these were never put into operation.

The commission feels it will be best to start this work in the spring of this year, the opinion being that the price of copper and other commodities necessary for the work will remain at the present level for some time to come.

The estimated cost of the work is approximately \$200,000, and it is expected that a year will be required to put in the conduits, another to put in the cables and repave the streets, and a third year to dismantle the existing overhead equipment.

The members of the Underground Conduits Commission

are Dr. L. A. Herdt, chairman, appointed by the Quebec Public Utilities Commission, Mr. R. S. Kelsch, representing the cable companies and Mr. De Gaspe Beaubien, representing the city of Montreal.

Dr. Frank B. Jewett Talks on Telephone Transmission, Wired and Wireless

Dr. Frank B. Jewett, chief engineer, Western Electric Co., Inc., of New York, reviewed the progress in telephonic transmission, both wire and wireless, during the last ten years, in an address before the Northern Electric Engineering Society at Montreal, on February 25th.

In 1910, said Dr. Jewett, communication by telephone was possible for a distance of about 1000 miles. There were a few telegraph cables then in use, and the cable between New York and Philadelphia, a distance of 90 miles, was considered a great achievement. There were no amplifiers in use at that time, and engineers had to choose between the phantom and the open wire systems.

The first improvement was the combination of the phantoming and loading. Then followed the Duplex system. The possibility of long cable circuits followed. Three different kinds of repeaters were employed at each of the six stations along the New York-San Francisco line which was opened officially at the Panama-Pacific Exposition in 1915.

The use of the electron tube, or audion, has opened up a new field of possibilities. The principle of this valve was explained by means of a moving picture film of considerable educational value. These films illustrated very effectively the flow of current in telegraph and telephone circuits. Lantern slides were also employed to illustrate the lecture, which was greatly appreciated by the large audience present.

At the conclusion, Mr. P. F. Sise, president of the Northern Electric Company Limited, moved a vote of thanks to the speaker; and was ably seconded by Dr. A. S. Eve, of McGill University. The president of the society, Mr. W. S. Vipond, introduced Dr. Jewett as the director of a large research organization which was particularly concerned with new developments in telephone and telegraphy. Mr. Vipond also referred to the speaker's distinguished services during the war.

20,000 h.p. Development for Price Bros.—Plant in Operation Shortly

On Feb. 1st, Fraser, Brace & Co., Ltd., contractors, completed work on the concrete dam and power house at Chuteaux-Galets, on the Shipshaw River, 23 miles north of Chicoutimi, P.Q. This plant will develop 20,000 h.p. and will furnish additional power to the pulp and paper mills of Messrs. Price Bros. at Kenogami and Jonquiere.

The dam, which is of the gravity type, is of concrete, 1,100 feet long, 24 feet high, with an additional 6 foot flash on top. Two 13-foot penstocks of rivetted steel, 130 feet long, deliver water with a total head from flashboards to tail-race of 102 feet.

Two Morgan-Smith turbines; exciters, two 8,000 kv.a. General Electric generators, six Westinghouse transformers of 2,700 kv.a., stepping up the voltage from 6,600 to 46,000, form the equipment of the plant, which will be in operation as soon as the generators are installed.

Work on this contract was started in September 1919, and as many as 450 men have been employed at one time. Transport was difficult and forest fires were an additional source of trouble. In June last the camp and a large part of the equipment were destroyed, but operations were speedily resumed. Concrete was poured without regard to temperature, the materials being heated during the winter.

Opening of New Electrical Laboratories at the University of Manitoba

The formal opening of the new Science and Engineering Laboratories recently completed for the University of Manitoba took place on Tuesday evening, the 22nd of February. Members of the Manitoba Government and Legislature and about a thousand friends of the university were present.

The new laboratories of the Department of Electrical Engineering are of special interest to the electrical engineers of Winnipeg and the province. They include a large main room for dynamo and motor tests, illustrated in the accompanying photograph. In addition to the main laboratory, there is a standardizing laboratory, an oscillograph room, a photometric laboratory and a high tension and high frequency laboratory, which is also to be equipped for radio work. The layout includes a workshop, a storage battery



New Dynamo Laboratory of University of Manitoba.

room and a store-room. The equipment of all laboratories and auxiliary rooms is very complete and up to date.

During the evening of the opening, experiments and tests were carried out by 3rd and 4th year electrical students, under the direction of Professor E. P. Fetherstonhaugh and assistant professor J. W. Dorsey. These experiments included demonstrations of high frequency and corona effects, the photometry of incandescent lamps, measurement of illumination, oscillograph tests on a transformer; tests of an induction generator, the calibration of instruments; a small arc furnace, and tests of motors and generators.

In the thermodynamic laboratory, which is included in the electrical department, the features were a brake test of an oil engine and a Fokker biplane, which was presented to the university by the War Trophies Department. This laboratory was under the direction of Major N. M. Hall, assistant professor in mechanical engineering.

The formal presentation of the buildings was made, on behalf of the Government, by Dr. Thornton, Minister of Education, and was replied to by Dr. J. A. MacLean, president of the University of Manitoba.

Electric Energy at Stamp Falls

Residents of Port Alberni, British Columbia, have already subscribed \$10,000 towards the sum of \$30,000, which is being raised to form a company for the purpose of developing electrical energy at Stamp Falls. The plans call for the installation of a unit of 500 horse power. The Mayor of Alberni, Capt. G. A. Huff recently had a conference with the Minister of Lands and other Cabinet Ministers at Victoria, B.C., and was assured that water rights would be obtainable

as soon as the company was financially capable of commencing work. These rights have been held for a number of years by the Ritchie-Agnew Power Company of Prince Rupert, B.C., and all the preliminary survey work was completed by that concern in 1913. Following the outbreak of war the Ritchie-Agnew Power Company postponed carrying out their plans and eventually gave up the idea, as one of its most important members died in France.

Two Well-Attended Montreal Electrical Luncheons

At the weekly luncheon of the Montreal Electrical Club, held on February 23rd, the name of the club was changed to "The Electrical Co-operative Luncheon," as the result of a ballot taken on the question of a closer alliance between the Club and the Electrical Co-operative Association, Province of Quebec. Thus the Electrical Co-operative Luncheon is now affiliated to the Electrical Co-operative Association, P.Q., but will carry on in the same manner as formerly.

Mr. K. B. Thornton, president of the Co-operative Association, outlined the activities of the Association, and stated that the electrical interests in the Province of Quebec would be sure to benefit by close co-operation. More than one-third of the electrical industry in Canada was being developed in Quebec, and the province was ripe for co-operation. Mr. Thornton referred to the efficient work done by the Quebec Streams Commission in providing for the future development of water power in the province.

Messrs. M. K. Pike, P. T. Davies, and W. H. Winter, president of the Montreal Electrical Club, also spoke in favor of co-operation between all those connected in any way with the electrical industry.

A musical programme had been arranged, and solos were worked in between the speeches. The visiting guests were: Messrs. G. Alward, A. Heald, R. M. Coxley, of Toronto, A. P. Broadhead, Granby; E. St.-Onge, Ste. Rosalie; J. A. Page, St. Cesaire; B. Farady, Richmond; H. B. Fisk, Drummondville; C. W. Cowan, St. Johns; L. H. Hill, Waterloo; J. W. Dunfield, Lennoxville; F. A. Chisholm, Sherbrooke; A. Irwin, Knowlton.

Is Economic Equality Desirable?

The Montreal Electrical Co-Operative Luncheon was given an interesting address by Mr. H. S. Ross, K.C., on March 2nd last. Mr. Ross, who had chosen as his subject "Is economic equality possible and desirable?" handled this very difficult topic very skilfully, having in mind the fact that he was presenting what many thought was an idealistic theory, to a practical audience. In this respect he was careful to consider the problem from the standpoint of practicability. Talking about trusts, Mr. Ross humorously said that like most other people he was opposed to them unless he was in them himself. The speaker stated that we had come to understand a great many laws of nature, but so far we had failed to grasp the law of human association, and in order to get the full advantages of co-operation it would be necessary to add to our knowledge of human nature first. In life we were always exchanging services, and it was the opinion of the speaker that a work unit should be used as a basis of exchange instead of the dollar.

Mr. L. C. Haskell took the chair in the absence of Mr. W. H. Winter, and besides presenting the speaker, called on Mr. K. A. McIntyre, of Toronto, to say a few words. Mr. McIntyre, in responding, referred to the progress of co-operation in the Province of Quebec, and stated that this progress was being watched carefully by the organizations in Ontario, which were developing along the same lines as in Quebec. The other out of town guests present were Messrs. C. H. Keeling, H. Eccles and W. S. Shannon, of Toronto, and Mr. G. P. Sweeney, of St. Paul, Minn.

Mineral Production of Canada During Year 1920—Metal Prices Generally Lower

The Department of Mines, Canada, has issued a preliminary report on the mineral production of Canada during the calendar year, 1920, prepared by the chief of the Division of Mineral Resources and Statistics, Mr. John McLeish. The quantities of metal mined during the year were, approximately, as follows:

Cobalt 594,000 lbs., copper 81,000,000 lbs., gold 767,000 ounces, iron ore 84,000 tons, lead 34,000,000 lbs., nickel 61,000,000 lbs., platinum 2,000 ounces, silver 13,000,000 ounces, zinc 40,000,000 lbs.

The prices of the various metals at the end of 1920 were approximately as follows: Copper, New York, 17.456 cents as against 17.275 in 1915 and a high of 27.180 in 1917; nickel New York, 45 cents as against 45 in 1915 and a high of 50 in 1917; silver, New York, \$1.01 per oz., compared with 50 cents in 1915 and a high of \$1.11 in 1919; tin, New York, 48 cents per pound as against 38 in 1915 and a high of 89 in 1918.

Regarding the production of copper during the year, the report makes the following interesting announcement:

Copper

The production of copper in 1920 amounted to 81,155,360 pounds (40,577.7 tons), which at the average price in New York of 17.456 cents per pound would be worth \$14,166,479 as against 75,053,581 pounds (37,527 tons) valued at \$14,028,265, or an average of 18.691 cents per pound in 1919.

Of the total production 63,395,830 pounds, or 78.1 per cent were contained in blister copper and in nickel-copper matte produced in Canada, part of which was refined at Trail, B.C., at Port Colborne, Ont., and at Deschenes, Que., the balance being exported for refining; 44,766 pounds, or 0.05 per cent were contained in copper sulphate, and 17,714,764 pounds, or 21.8 per cent estimated as recovered from ores exported to United States smelters.

The total production of refined copper in 1920 was 2,620.2 tons, being the production at the electrolytic refinery of the Consolidated Mining & Smelting Company at Trail, B.C., and at the refinery of the British America Nickel Company's plant at Deschenes, Que. The production in 1919 was 3,467 tons of refined copper.

The production in Quebec was, as usual, from the pyritic ores of the eastern townships which are shipped primarily for their sulphur content, and amounted to 768,282 pounds, valued at \$134,111, as against 2,691,695 pounds valued at \$503,105 in 1919.

The production in Ontario amounted to 31,980,967 pounds valued at \$5,582,440, as against 24,346,623 pounds valued at \$4,550,627 in 1919. This production is derived from the treatment of the copper-nickel ores of the Sudbury district, supplemented by a small recovery from the silver ores of the Cobalt district, and the copper ores of the Bruce mine, Sudbury district.

The production in Manitoba amounted to a little over three million pounds in 1920 as in 1919 and was shipped from the Mandy mine at Schist lake, northwest of The Pas. The Mandy Mining Company suspended operations towards the end of 1919 so that the ore shipped in 1920 had been mined during the previous year.

Most of the equipment at the Mandy mine was sold to a syndicate which was doing extensive development at the Flin Flon property, on Flin Flon lake in the same district.

The survey for a railroad from the Hudson Bay railway line has been undertaken so that in time this new district

will be an important contributor to the Canadian production of copper.

The production from British Columbia was 45,344,434 pounds valued at \$7,915,324, as against 44,502,079 pounds, valued at \$8,317,884 in 1919. The production included 44,766 pounds as copper sulphate; 28,419,307 pounds as blister copper partly refined at Trail and partly exported for refining; and 16,880,361 pounds being the estimated recoveries from ores exported to American smelters.

We have no record of any production from the Yukon for the year 1920, whereas in 1919 the production was 165,184 pounds valued at \$30,874. This production as in past years has been derived from the copper mines of the Whitehorse district.

The exports from Canada in 1920 were: Copper fine, in ore, etc., 23,665 tons, valued at \$5,917,782; blister copper 19,099 tons, valued at \$8,701,184; copper in pigs, bars, sheets, etc., 1,332.2 tons, valued at \$710,978; and copper "old and scrap," 387.2 tons, valued at \$113,265, giving a total of 44,485 tons, valued at \$15,444,209, besides copper wire and cable valued at \$433,097. The total exports in 1919 were 41,058 tons valued at \$14,654,640.

The imports of copper in ingots, bars, etc., and in manufactured form in 1920 were valued at \$4,558,234, as against a reported value of \$3,599,297. The quantity imported in 1920 would approximate 10,500 tons, as against 10,000 tons in 1919.

The price of copper, which was around 19 cents per pound in January, remained fairly steady above 18 cents until October, when it dropped to below 16 cents and gradually declined to 13 cents at the end of December, 1920.

Manitoba Electrical Men Fired With Enthusiasm for Co-operation

(By our Winnipeg Correspondent.)

Mr. W. C. Taylor, assistant engineer of the Winnipeg Electric Railway Company, made a decided hit at the semi-monthly luncheon of the Manitoba Electrical Association, held at Winnipeg on Thursday, March 3rd. A large number of the members present requested that the address be reproduced verbatim. Here it is just as the words fell from the speaker's lips, though, unfortunately, we cannot reproduce Mr. Taylor's personality:

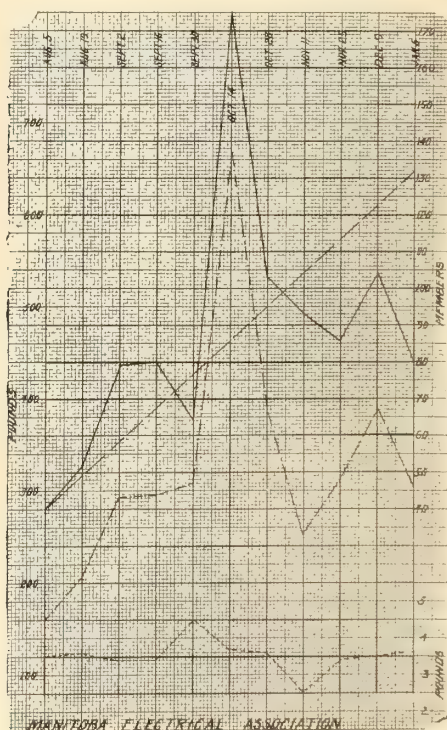
After hearing some of Bill Goodwin's inspiring addresses, I became fired with enthusiasm to help in the new era of co-operation. As I have nothing to sell I have nothing to advertise, and it bothered me a good deal to know how I could bear my share in the noble work. However, realizing that research work is the basis of all advancement, I determined to take up that branch in the hope that I might uncover some deep hidden truth of service to my fellow members. Like all missionary efforts, research work should begin at home. We are not particularly interested in abstract speculations; what we want is something practical, something useful, something that will control the almighty dollar. I decided that the subject nearest home to us is the Manitoba Electrical Association. In my study of the subject, I have discovered many facts which I am sure will be of great interest and use, not only to the association as a whole, but also to many individual members.

This full black line, gentlemen, is a graph of the lunch attendance since August 5th. You will observe that we carried our peak load on October 14th, the day of the Goodwin convention. The high attendance on October 28th is evidently the result of guilty consciences. You will observe also that we lagged on September 30th and November 25th. The reason for this is plain; being near the end of the month, the members were broke. I am sure you will agree with me,

gentlemen, when I say that this proves conclusively the inadequate remuneration of the engineering profession.

Goodwin told us we were all dressed up and had no where to go. That was wrong, for this curve of attendance acceleration shows that we are "going" to have an attendance of 178 by the day of St. Patrick of glorious memory.

After several conferences with the chef, to whom I am indebted for much useful information, I was able to obtain from him a record of the food consumed at each luncheon. This information, gentlemen, is plotted in the dash dot line. Now, gentlemen, you would naturally expect the food consumed to be very nearly proportional to the members present, and that the two graphs would closely resemble each other. Observation at once shows you that this is not the fact. By differentiating I obtained this graph shown in a dotted line, which is the average food consumption per member per meeting. The high average obtained on September 30th is easily accounted for. The attendance being small there were



Statistical Curves on Manitoba Electrical Association.

many vacant places and some of the members at the outlying tables succeeded in swiping a double lunch.

The low average on November 11th was not so easily accounted for, as I could not conceive of any member going without his lunch. However, after a careful study of the attendance register I discovered this significant fact,—November 11th was the only meeting from which Geo. Guy was absent.

Now, gentlemen, that is all very well for pure science. Here, we are all practical. We are more interested in the monetary aspect of the case, in the operating costs, the capital expenditures, depreciations and revenues.

The treasurer informed me that 140 members have paid a fee of three dollars, making a total payment of \$420.00. This, gentlemen, is quite evidently capital investment and must be treated as such, but as these fees are only of one year duration in our operating costs, we must provide for a sinking fund of \$420.00 to allow of their retirement at the end of the year. In eleven meetings we have had an attendance of 953. Allowing the same average for 26 meetings, we have a total attendance of 2252 members for the year. These luncheons, averaging as they do a dollar a plate,

give us an expenditure of \$2,252.00. Thus the total operating cost for the year amounts to \$2,672.00.

To offset this enormous operating cost, we will now consider the various items of revenue.

The distance from the corner of Main and Portage to the Y.M.C.A. is 3,300 feet. This is approximately the average distance travelled by the members in attending the lunch and probably occupies 15 minutes. Thus coming and going, each member travels 6,600 feet in half an hour. Allowing the average weight of the members to be 140 pounds, we have developed 462,000 foot pound hours of energy, or for the entire year for the association 1,040,424,000 foot pound hours, which converted to a more familiar electrical unit is equal to 392 k.w.h. This, at 3c per k.w.h., gives us a value of \$11.76.

As you all know, gentlemen, the food consumed acts as fuel, and supplies the heat of the human body. After an exhaustive search of medical literature I found that the best authorities estimate that the average radiation of the human body is 17 B.t.p. As lunch has to supply this heat for an average of six hours, we have a radiation of 6,120 B.t.u. per member, or 13,782,240 B.t.u. per year. Taking anthracite coal of 12,000 B.t.u., worth \$22.00 per ton, we find that one B.t.u. is worth .0000916 cents. Thus our total heat production is worth \$12.62.

In a little book containing a great deal of valuable information, and known as Dr. Chase's Almanac, that eminent scientist makes the statement that the average capacity of the human lungs is 320 cubic inches, and that the average respiration is 16 per minute, thus producing 2.6 cubic feet per minute or 177.6 cubic feet per hour. Now, gentlemen, I have observed that at these lunches the general conversation lasts about an hour and that half the members are talking at once. This means that we have a yearly production of 199,977.6 cubic feet.

To go a little into the chemistry of this, you all know that air is composed of four parts of nitrogen and one of oxygen or N_2O . This, coming in contact with the moisture of the lungs, yields N_2O & $H_2O = H_2$ & N_2O_2 , or to simplify 2 (H & N_2O). Now this N_2O or nitrous oxide is what is given off in the breath during conversation and has a market value of 1½c per cubic foot, when purchased from a dentist, under the common name of "laughing gas." Thus you see our total production of laughing gas has a value of \$2,999.66.

This makes our total income from the three sources, energy, heat and gas, \$3,024.00, leaving us a profit over our operating costs of \$352.00.

Thus, gentlemen, you see that at the end of the year the association should be able to declare a dividend of 83%. How much more do you want?

Ottawa Light, Heat and Power Co., Annual Meeting

The Ottawa Light, Heat & Power Co. shows earnings of 6.12% on its capital outstanding during 1920, out of which a 6% dividend was paid, leaving a surplus of \$4,108. The present surplus is \$128,091, the surplus for 1919 being \$123,983. The total assets amount to \$9,092,877 or \$2,479,809 more than the previous year. The current assets amount to \$490,083, an increase of \$150,492. At the annual meeting of the shareholders of the company held on March 1st, the following directors were elected: Messrs. T. Ahearn, Warren Y. Soper, Abner Kingman, Geo. F. Henderson, K.C., Wm. Manuel, M.D., W. C. Pitfield, H. H. Horsey, Thos. Workman, W. Lyle Reid and A. A. Dion. At a subsequent meeting of the directors Mr A. Ahearn was elected president, and Mr. Warren Y. Soper vice president.

Winnipeg-Portage la Prairie Power Transmission Line

The Manitoba Power Commission Completes Initial Step in Distributing Electricity to the People of that Province

By J. ROCCHETTI

Chief Engineer, Manitoba Power Commission

The Manitoba Power Commission was appointed in July, 1919, following the passing by the Legislative Assembly of Manitoba of an Act for the Transmission of Electric Power.

The first undertaking of the Commission was the building of a transmission line from Winnipeg to Portage la Prairie. This work was completed in August, 1920, and since that time the line has been successfully in operation. The total length of the line is nearly sixty miles, and the current is transmitted at 66,000 volts underground delta.

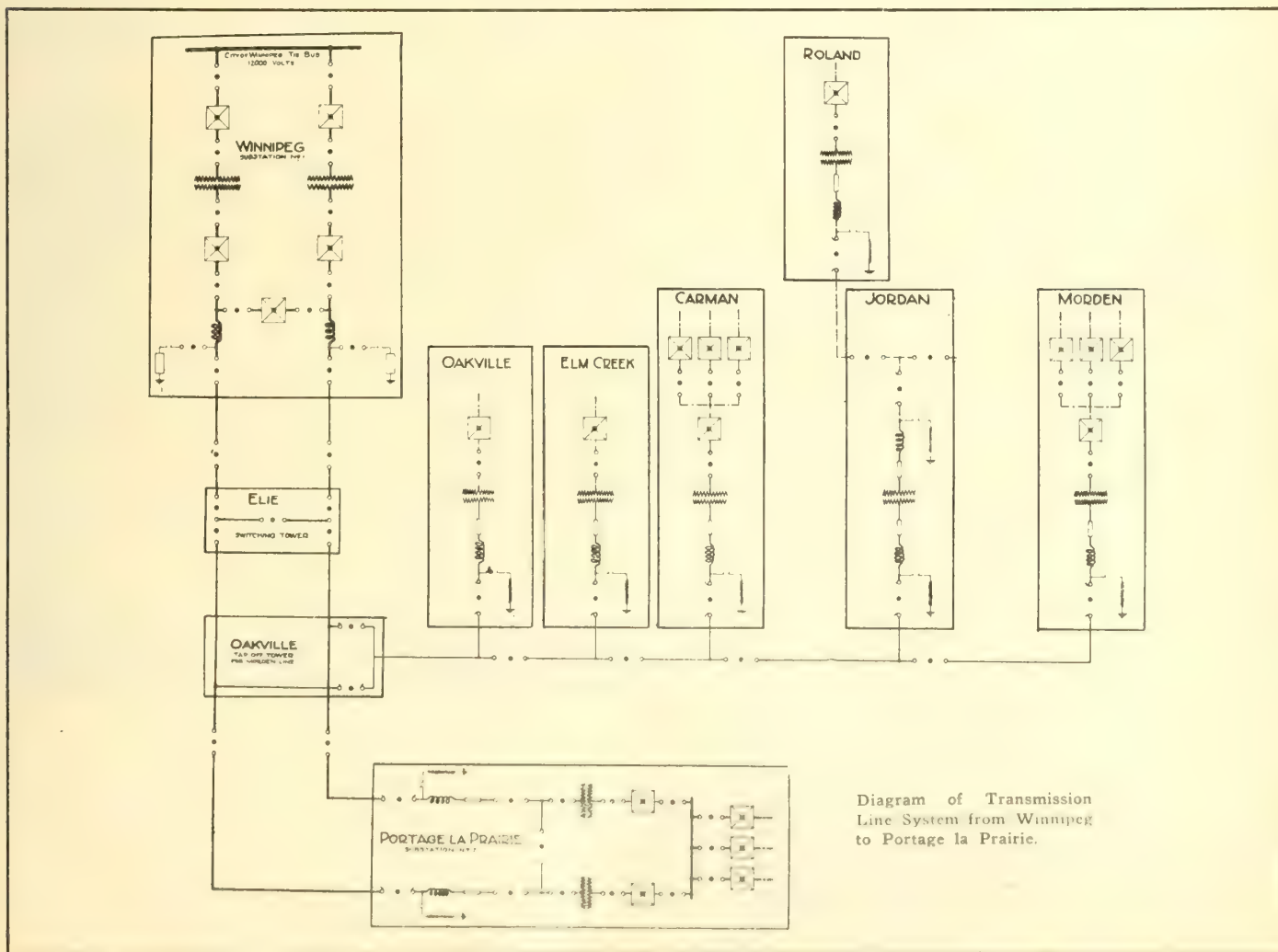
For its present needs the Commission has a contract with the City of Winnipeg Light & Power Department for the supply of electrical energy. This energy is delivered from the three-phase bus-bars at the Scotland Avenue sub-station at a nominal voltage of 12,000 v, and a frequency of 60 cycles. At present one bank of single-phase, 500 kva, 12,000/66,000 volts, oil-insulated, self-cooled transformers is installed. Another bank of three single-phase, 1000 kva,

12,000/66,000 volt transformers will be installed before the end of February. Both low tension and high tension sides of the transformers are operated ungrounded delta. The high tension room contains two 300 amp., 70,000 volt automatic oil switches, and a high tension bus tie non-automatic oil switch.

Choke coils and electrolytic lightning arresters, mounted with impulse gap, have been installed for the protection of the station. All switches are remote control, electrically operated.

When this sub-station is completed, full flexibility of operation will be realized for the two circuits of the transmission line. To date only one circuit has been installed, but the towers were designed for two circuits, and the installation of the second circuit will be started as soon as weather conditions permit.

The Portage transmission line was built by the Com-





Portage la Prairie-Winnipeg Transmission Line. On the left a standard transposition. Right, outdoor terminal station at Portage la Prairie.

mission's own men. The accompanying map shows the location of this line.

Galvanized steel had been specified for the towers, which were supplied by the Canadian Bridge Company. Steel foundations were to have been used throughout, but it was found that this style of foundations was not suitable for the Manitoba soil, and subsequently it was found necessary to reinforce them with concrete. In general, pin insulators are used with suspension insulators for anchoring.

The conductors are of No. 1/0 aluminum cable, steel reinforced; a ground wire $\frac{3}{8}$ " diam., of Martin-Siemens steel strand, is carried on the tops of the towers.

The standard span is five hundred feet, but inside the city limits a span of four hundred has been used, the longest span is about seven hundred feet, crossing the Assiniboine River near High Bluff.

The general design of the line consists of three spans supported by "A" frame flexible towers, the next span

being supported by a square tower. Every two miles there is an anchor tower to which conductors are dead-ended. For about ten miles, where the line is exposed to the gale coming from Lake Manitoba, the supports are alternately square and flexible, and anchor towers are located each mile. Inside the city limits, special narrow-latticed poles were used, with the foundations solidly concreted. Special care was taken where the line crosses railroads, or over telephone or existing transmission lines.

As the transmission line parallels the telephone trunk line and railroad telegraph and telephone lines for a number of miles, very careful transpositions were made of the power conductors to avoid interference. With proper insulation and



Portage la Prairie Transmission Line Crossing over Another Transmission Line.



Portage la Prairie Transmission Line—Railway Crossing over G. T. P. Ry.

short-length transpositions trouble was not anticipated, and indeed, since the line has been in operation, no trouble from this source has been experienced. A telephone service line parallels the power line from one end to the other.

Sectionalizing and selecting switching towers are installed so that the line is in three sections of twenty miles each.

The terminal station at Portage la Prairie is located near

the city limits, on Saskatchewan Avenue, and from this terminal a line of low voltage was built to connect the city's switchboard, located in the pump-house. This line is about seven thousand feet long. Wood poles are used as a support for two three phase circuits consisting of copper conductors of No. 4/0, and more circuits may be added to take care of future requirements.

For the terminal at Portage la Prairie, all high tension equipment is installed out of doors, the low tension equipment being housed in a brick building. This is the first of this type of terminal installed in Manitoba, and it has proved quite satisfactory.

A bank of three outdoor single-phase, 500 kv.a., 60-cycle, 66,000/2,400 volts, oil-insulated, self cooled transformers is



Winnipeg-Portage la Prairie Transmission Line and Proposed Extension to Morden.

installed on a concrete platform, and its high tension control is secured by means of mechanically operated 70,000 volt, horn gap switches, while the protection consists of fuses, choke coils and horn gap lightning arresters with resistance in the ground circuit of each phase and auxiliary horn gap. These apparatus are mounted on a steel structure. The low tension switchboard has mounted on it a main and three feeder oil circuit breakers, and all meters and relays.

A second unit, duplicating the above, will be installed as soon as the second circuit on the transmission line is completed.

A special feature in connection with the building of this line is that the work was carried on during one of the most severe winters ever experienced in this section of the country, with snow several feet deep, and in open country, without protection against winter gales.

At present the Commission is engaged in the construction of a branch line south to Morden, tapped off the Portage line at Oakville.

Meanwhile the Commission has installed two semi-Diesel plants, one in Minnedosa and the other in Virden. It is expected that these plants will be in operation by the middle of February.

New Electrical and Acoustics Experiments Performed Before Northern Electric Engineering Society

At the meeting of the Northern Electric Engineering Society, held in the Physics Building, McGill University, Montreal, on Feb. 7th, Dr. L. V. King performed some interesting experiments in electricity, magnetism, and acoustics.

Electrostatic attraction, the loadstone, artificial magnets and the first experiments resulting in the first electric motor were briefly reviewed, and were followed by an experiment showing the demagnetization of iron by the application of heat.

A mechanical model of magnetic substances, consisting of a number of small compasses placed in a magnetic field, showed how the particles of a magnetic substance probably behave under the action of an external field.

By means of small steel balls placed on a concave glass disc of fairly small uniform curvature, resting over a coil,

a model showing the structure of the atom can be made. On a c. current being applied, the balls on the disc tend to repel one another according to the fourth power law. They are then attracted to the centre, the attraction being proportioned to the distance, and arrange themselves in groups which illustrate in a rough way the system of electrons around a nucleus, such as we find in an atom.

It is generally stated in text-books that a diamagnetic substance, such as bismuth, will set itself at right angles to the lines of force in a magnetic field. Dr. King showed that in a uniform magnetic field, as between the two flat polepieces of a magnet, a bismuth bar will set itself parallel to the lines of force. If, however, the polepieces are conical, the ends of the bar will move to the weaker part of the field, and the bar will set itself at right angles to the field, which in this case is of variable intensity.

Liquid air is strongly magnetic, as can be shown by pouring it between two polepieces, in a magnetic field.

When a flat metal disc is placed over a coil, lying horizontally, and through which an alternating current is passed, it will be repelled, and we have then the striking experience of a plate floating in air. This happens because eddy currents are induced in the plate and these are out of phase with the radial current set up by the coil. As a result, the disc also becomes very hot. If the disc is replaced by iron filings on a piece of card-board placed over the coil, these filings arrange themselves in a curious symmetrical pattern. As the attraction between them is proportional to the square of the induction, it is easy to prove that there are forces existing which vary with twice the frequency of the original a. c. This is evident from the sound produced by the vibration.

A special feature of this sound generator is a diaphragm whose natural frequency may be altered by the application of compressed air.

The development of fog-signal machinery has been retarded by the fact that experimental tests are not only very costly, but have to be conducted at isolated stations far removed from laboratory facilities. In spite of these difficulties, however, Canada has been among the most progressive of maritime countries in the experimental development of fog-alarm systems. Audible signals may be generated more efficiently and will travel with more certainty and to greater distances in water than in air. The extent to which it is possible to protect a trade route in this way from accidents due to fog depends ultimately on the power, penetration and reliability of the fog alarms which can be installed and operated at a given cost. The cost of experiment in this connection will be more than repaid through the reduction of the yearly toll in lives and property resulting from accidents at sea.

It is now possible to arrange a combination of wireless and submarine signals whereby a ship can obtain both its bearing and distance from a fog alarm station. A ship, listening in for these two signals, will first hear the wireless dashes, and soon after the submarine signals will be received. The interval between the reception of the two signals will give the distance from the station.

In conclusion, Dr. King showed a vibration galvanometer of his own invention actually receiving wireless messages from a sending station, the signals being read visually.

After the lecture, Messrs. Scantlebury and Demers, of the Marconi Wireless Telegraph Company, treated the audience to a wireless concert, the strains from a gramophone being received from the company's station in Montreal, and amplified by means of a trumpet.

Mr. Stanley Vipond thanked all those responsible for the success of the evening, and hoped that a similar meeting would be held in the near future.

Further Opinions re Grounding of Electrical Appliances

Engineers in Various Capacities Make Helpful Suggestions

Sudbury, Ont.

Editor Electrical News:—

I have your letter of recent date with reference to the matter of the life hazard on electrical appliances. At this particular time I am afraid I could not give you anything new on the matter, of sufficient interest for publication. Personally, I have not yet reached a definite conclusion in my own mind as to the solution of this difficulty, but up to the present I believe that the greatest safety lies in careful grounding of the outside conductors, and greater care in the design and installation of appliances.

While the 3-wire plug with one terminal to ground offers a possible solution, yet it seems to me that quite a few years must elapse before all buildings and appliances could be so wired. This is one of the greatest difficulties I foresee in the adoption of this idea.

On the other hand, I believe that improved methods of manufacture could be insisted upon and results obtained within a reasonable time. In speaking of this matter I have reference in particular to appliances which are on the market, and being manufactured, which rely on insulation from ground on flimsy pieces of mica largely, with a small eyelet for the conductor, which results after a short time in service in the mica becoming displaced and the conductor coming in contact with the body of the article. I believe that a much wider use of porcelain for bushings and supports for conductors would be beneficial, for the reason that the "handy man" around the house cannot so readily cause trouble as with some of the flimsy mica arrangements which are now in use.

Of course we are again limited in the application of porcelain to certain lines of appliances, but where the use of porcelain is impossible I think that moulded insulation of a proved kind could be more largely used.

As a number of accidents seem to have occurred from air heaters, I think the adoption of improved insulating methods in some of these might very well be carried out, and in the ordinary types of this class of heater I do not see why it cannot be so insulated that it would be practically impossible to get any shock from same.

These are just a few rambling thoughts that have occurred to me at this time, and I do not know that they will be of any assistance to you. However, "In multitude of counsel there is wisdom" and I sincerely hope that out of the many discussions that have taken place on this matter that in the near future some practical solution of the difficulty will be reached. In the meantime I wish you success in your efforts to arrive at the correct solution.

Yours very truly,

R. H. Martindale, Superintendent,
Electric Light and Waterworks Department.

Three-Point Plug Expensive

St. Catharines, Ont.

Editor Electrical News:—

In answering the various questions in your letter of Feb. 6th, I must tabulate them for you.

1st. The discussion of the question of "Grounding Appliances" should continue, because we are sure that lives will be lost by the continuance of present conditions.

2nd. Education might help, but would not be the sure

answer. They still use the coal-oil can to start the fire though we all know the dangers.

3rd. The three point plug you suggest is positive but rather expensive for both new or old installations, requiring not only a change in all plugs and receptacles but additional wiring. Can we not find as positive a cure without the expense?

4th. If the plug and receptacle are to be changed, use a plug that must always go in the same way, say a "T" shape receptacle with the stem of the "T" always connected to the ground wire of the circuit, and the corresponding contact of the plug connected to the frame of the appliance.

Yours very truly,

P. B. Yates, Manager,
Public Utilities Commission

Should Not Use Screw Plug

Winnipeg, Man.

Editor Electrical News:—

In reply to your inquiry of recent date asking for our viewpoint on the question of heaters in bathrooms and the danger to life from such installations: I would state that I heartily concur in Mr. Cambridge's statements recently published in your Journal.

If portable heaters are to be allowed in bathrooms they should certainly be wired up to a three point plug, one point of which connects the frame of the heater to a properly grounded conductor. Also, all bathroom fixtures should be so arranged that it is impossible to connect the ordinary Edison screw or plug connector to them. This would obviate the public using heaters fitted with these connections in bathrooms. The same rule should be applied to all heaters which are placed adjacent to any grounded metal work, such as radiators, water piping, etc., and with which it is possible to come in contact when handling the heater. For ordinary use, where there is no possibility of coming in contact with grounded metal work the present method of using heaters should be satisfactory. In any event, there is no question that the grounding of the neutral of the secondary system provides a very efficient safeguard to life and should be insisted on.

Yours truly,

E. V. Caton, Chief Engineer,
City of Winnipeg Hydro-Electric System

Need for Rigid Inspection

Winnipeg, Man.

Editor Electrical News:—

Referring to your editorial of the 15th of January in regard to bath-room fatalities from electrical causes, it is a question that should be given attention by manufacturers, contractors, lighting companies and any other person installing or selling this class of apparatus.

I agree with you that it is a difficult problem, and it is my opinion that it is a case of simply educating the buying public to the fact that there are certain conditions under which any electrical apparatus is liable to be dangerous.

I agree with Mr. Cambridge in his opinion regarding equipping bath-rooms by having the lighting outlets placed upon the ceiling out of reach and making it as difficult to attach a portable to as is possible, and also that the neutral of a three-wire system or one side of a two-wire system supplying current to buildings for lighting and heating purposes and so forth should be grounded in a thoroughly efficient manner.

It would be helpful also if municipal inspectors and city engineers in charge of this work absolutely refused to allow certain electrical apparatus to be used where the same is of faulty design, or where there is a liability of it being

dangerous, even to the extent where they are liable to get a bad reputation with certain classes of manufacturers or contractors who handle this kind of apparatus, in the fact that they refuse to allow it to be installed. On the other hand it tends to make the sale of good apparatus better, and also benefits the public and the contractors who handle nothing but first-class electrical apparatus.

It might also be of benefit to put warning tags on all electrical appliances, drawing attention to the fact that they are dangerous to use where there is liability of a person being able to touch water pipes and such.

I believe that you are on the right track in this, and if this matter is given attention by the proper parties, and the public educated to the fact that there is always a liability of danger if they are not used correctly, that it will not prevent the sale of electrical appliances, but will make the public more careful in the kind they buy, and will tend to cut out amateur wiremen, and will also benefit the contractors and manufacturers,

Yours very truly,
D. K. Lewis, Electrical Engineer,
Winnipeg Electric Railway Co.

Suggests Design of Heater

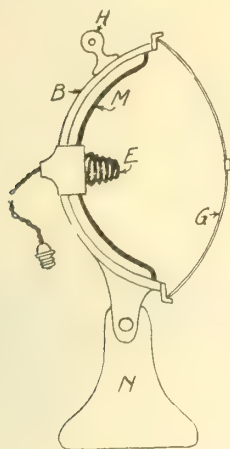
North Bay, Ont.

Editor Electrical News:—

Replying to yours of the 16th ult., re grounding of appliances, it appears to me that there are just two ways of overcoming danger to life from the faulty wiring or construction of portable appliances and these are:—

1st.—By a campaign of education covering the use of portable appliances and the method of repairing, pointing out that an appliance should not be repaired unless the work is properly done with material made for and to fit the appliance being repaired. You might go further and make it illegal to make any repairs without installing the proper material, etc.

2nd—Portable appliances should be made as far as possible "fool proof." There is no question in my mind but



In the figure herewith B represents the body made of Bakelite or other insulating material; H is the handle; M the metal reflector with nearest metal parts $1\frac{1}{2}$ inches from element or electric conductor; E, elements; G, wire guard supported on non-conductor body of appliance; N, metal base, may be made with non-conductor covering.

that all of the portable appliances now on the market could be made with a larger safety factor. It is going to cost more to manufacture the appliance but not nearly as much as it would to re-wire all buildings for a three-terminal plug where portable appliances are used. I am quite sure that if I purchased an appliance with a three terminal plug, that neither the landlord or myself would pay for the necessary wiring so that the appliance could be used; but I would soon change the wiring of the appliance so that it could be used on the regular sockets and hundreds of others would do the same.

Take, for instance, a portable heater of the reflector type. This could be built partly of a non-conductor and partly of metal as per the sketch herewith. I cannot see why a construction similar to this could not be used in nearly all of the portable appliances made.

You will note by the sketch that the wire guard is attached to a non-conductor frame and cannot come in contact with the reflector or element. The metal reflector is also attached to the non-conductor body and cannot come in contact with the wiring element or guard. The element is supported by a non-conductor frame. The flexible cord also passes through the frame and cannot come in contact with any metal part. Of course this type of construction will not make the safety factor 100% but it will eliminate the more common troubles we have experienced with portable appliances and the writer believes that construction following the lines suggested above will correct fully 80% of the accidents caused by appliances becoming grounded.

Yours truly,
R. H. Stafford.

Ice Prevention in Hydro Plants

On March 3rd a joint meeting of the American Institute of Electrical Engineers, Toronto section, and the Engineering Institute of Canada, Toronto branch, was held in the Chemistry and Mining Building of the University of Toronto to hear Mr. John Murphy, consulting electrical engineer with the Dominion Government. The topic of Mr. Murphy's address was "Ice Prevention in Hydro Electric Power Plants," and he outlined a series of personal investigations along this line, illustrating them with some original slides and motion pictures. These pictures showed how ice formed, causing many hydro electric plants to close during a portion of the winter because of the formation of frazil and anchor ice. Mr. Murphy demonstrated that there is only a minute fraction of a degree difference in temperature between a freezing and thawing condition. His method of solving the ice problem is based on this fact and its practical application consists of heating the metal parts which contribute to the formation of ice to a temperature perhaps only $1/1000$ of a degree above freezing point. This prevents the formation of frazil at an almost insignificant expenditure of coal, one ton per day being sufficient to keep a power plant of 3,000 h.p. from freezing.

Speaking of the problem on the St. Lawrence River, he showed that 144,000,000 times more water passes downstream than is turned into ice and that, therefore, the problem of preventing ice was not as involved as it appeared to the lay mind.

French River Power

A deputation from Northern Ontario has presented to the Federal Government a scheme for developing Hydro-electric power on the French River. According to the members of the deputation 35,000 horse-power is waiting to be developed from the French River rapids. It is claimed that there is a ready market for this power, as the industries at Sudbury are developing electric power from coal at a cost of \$150 a horse-power. The French River is in the hands of the Federal Government, but the delegates from North Bay claim that the development of power is the right and privilege of the Hydro-electric Power Commission. The sale of the power, it is said, will produce sufficient revenue to cover all carrying charges, and the shipping costs on coal alone would save the north country \$1,300,000 in freight charges annually.

Mr. M. E. Deering, who for the past twelve years has been acting as consulting automatic and manual telephone sales engineer for the Northern Electric Company, Limited, Winnipeg, has just been appointed manager of the Winnipeg branch of his firm, succeeding Mr. J. E. Gilmour, who has been transferred to the Montreal office of the same firm.

Complete List of Officers of Electrical Co-operative Association of the Province of Quebec

Below we give a complete list of the officers and advisory council of the Electrical Co-operative Association of the Province of Quebec. The wide variety of interests represented by the personnel indicates how thoroughly the co-operative movement has taken hold of that province. Central stations, manufacturers, jobbers, retailers and engineers are all working together for the good of the industry.

Hon. President:—J. S. Norris, vice president Montreal Light, Heat and Power, Consolidated.

President:—K. B. Thornton, general manager Montreal Public Service Corporation.

Vice-presidents: M. K. Pike, general sales manager Northern Electric Company, chairman; J. B. Woodyat, general manager Southern Canada Power Company, Ltd.; J. W. Pilcher, Canadian General Electric Company, Ltd.; F. J. Parsons, manager McDonald & Willson, Ltd.; M. Simoneau, Simoneau Electric Contracting Company; Dr. L. A. Herdt, McGill University; R. J. Beaumont, Shawinigan Water & Power Company.

Hon. Sec.-Treas.:—L. C. Haskell, Southern Canada Power Co. Ltd.

Manager-Secretary:—J. N. Mochon.

Advisory Council

Central Station Representatives:—W. O'Brien, Montreal Light, Heat & Power Co. Consolidated; L. C. Haskell, Southern Canada Power Co. Ltd.; N. L. Engel, Montreal Public Service Corporation; W. J. Lynch, Quebec Railway, Light, Heat & Power Co.

Manufacturers' Representatives:—C. Duncan, manager Duncan Electrical Co. Ltd.; G. Wight, Monarch Electric Co.; C. F. Medbury, general manager Canadian Westinghouse Co. Ltd.

Jobbers' Representatives:—J. W. Pilcher, gen. manager Canadian General Electric Co. Ltd.; M. K. Pike, gen. sales manager Northern Electric Co.; Ltd.; J. W. Smith, president Electrical Equipment Co. Ltd.

Contractor-Dealers' Representatives:—J. A. St. Amour, electrician, Montreal; F. J. Parsons, McDonald & Willson,

Montreal; W. B. Shaw, Montreal Electric Co. Ltd.; J. M. Walkley, Henry Morgan & Co., Ltd.; Montreal; W. Rochon, contractor, Montreal; R. H. Doddridge, manager Quebec Electric Co. Quebec; J. Nault, Nault & Brown, Three Rivers; W. Wiggett, Electric Repair & Contracting Co., Sherbrooke.

Consulting Engineers:—De Gaspé Beaubien, Montreal; J. M. Robertson, J. M. Robertson & Co., Montreal.

Public Utility Company Representatives:—H. R. Mallison, purchasing agent Montreal Tramways Co.; J. A. Shaw, electrical engineer, Canadian Pacific Railway; W. H. Winter, general superintendent of plant Bell Telephone Co. of Canada.

Building Electric Power Line

In conjunction with Mr. C. Moulton, of New Westminster, B.C., the Chilliwack Electric Company of Chilliwack, B.C., has secured the contract for the electric power line for the main power supply on the Sumas Lake reclamation work. The power line to be installed will be a permanent one as upon completion of the dykes and other works, it will be used in connection with the transmission of power for a series of 54 inch centrifugal pumps to be installed. This is the second large contract the Chilliwack company has secured lately, the other being the extension of the British Columbia Electric power and light line from Chilliwack to Rosedale. The latter work was supposed to have been started last year but high costs of equipment held up operations. The estimated costs of the two works exceeds \$50,000.

Westinghouse Builds New Experimental Laboratory for High-Voltages

Owing to the trend toward higher voltages which is being initiated in the Western United States, and which will, no doubt, ultimately extend to all parts of the continent, the Westinghouse company is building a complete, modern, high-voltage, experimental laboratory. In this laboratory will be installed two transformers, one rated at one million volts, 1,000 kv.a., the other rated at one million volts, 500 kv.a. This will allow voltages for flashover testing as high as one and a half million volts. The laboratory will be 120 feet long, 110 feet wide and 50 feet high, without columns of any sort. High-voltage insulators, transformer terminals and circuit breaker terminals will be tested in this plant.



Dr. L. A. Herdt, Vice-President, Quebec Electrical Co-operative Ass'n.



J. S. Norris, Hon. President, Quebec Electrical Co-operative Association.



R. J. Beaumont, Vice-President, Quebec Electrical Co-operative Association.

The Electrical Contractor

Contractors Discuss Working Rules and Estimate Sheet **Final Discussion on Latter at April Meeting—** **Write Your Opinion Out or Come** **Ready to Talk**

At the regular monthly meeting of the Toronto section of the Ontario Electrical Contractor-Dealers on March 3rd, two important matters were discussed. The first had reference to the working arrangement between the contractors and their employees during the present year. President Drury outlined the work of the committee which has had this matter in hand, and the meeting approved their recommendation. These "working rules," as approved, are given below.

The other important matter discussed was that of the Standard Estimate Sheet. As reported in our last issue, the committee appointed for this purpose have brought in a report, and the chairman called on Mr. Harry Rohleder to explain the two estimate sheets they had prepared. A limited amount of discussion followed, but it was pointed out by the chairman that the actual discussion of these sheets would take place at the April meeting, when he expected them to come prepared to present very definite views so that the committee could then go ahead and prepare the final draft.

DECLARATION OF PRINCIPLES

An important step has been taken during the past year toward closer co-operation of employees and employers in the electrical contracting industry, namely by the adoption of the "Declaration of Principles" set forth herewith. They were adopted by the July 1919 convention of the National Association of Electrical Contractors and Dealers, and by the September 1919 Convention of the International Brotherhood of Electrical Workers, being ratified by referendum vote of the latter organization in December, 1919.

Preamble

The vital interests of the public and of employee and employer in industry are inseparably bound together. All will benefit by a continuous, peaceful operation of the industrial process and the devotion of the means of production to the common good.

Principles

(1) The facilities of the electrical industry for service to the public will be developed and enhanced by recognizing that the overlapping of the functions of the various groups in the industry is wasteful and should be eliminated.

(2) Close contact and a mutually sympathetic interest between employee and employer will develop a better working system, which will tend constantly to stimulate production, while improving the relationship between employee, employer and the community.

(3) Strikes and lockouts are detrimental to the interests, alike of employee, employer and the public and should be avoided.

(4) Agreements or understandings which are designed to obstruct directly or indirectly the free development of trade, or to secure to special groups special privileges and advantages, are subversive of the public interest and cancel the doctrine of equality of rights and opportunity, and should be condemned.

(5) The public interest is conserved, hazard to life and property is reduced, and standards of work are improved by fixing an adequate minimum of qualifications in knowledge and experience as a requirement precedent to the right of an individual to engage in the electrical construction industry, and by the rigid inspection of electrical work, old and new.

(6) Public welfare, as well as the interests of the trade, demands that electrical work be done by the electrical industry.

(7) Co-operation between employee and employers acquires constructive power, as both employees and employers become more completely organized.

(8) The right of employees and employers in local groups to establish local wage scales and local working rules is recognized, and nothing herein is to be construed as infringing that right.

WORKING RULES

(1) Adopted by the Toronto District of the Ontario Association of Electrical Contractors and Dealers, for the guidance of its members, on January 6th, 1921, in force to June 30th, 1921, and agreed to by Toronto Local 353, I. B. E. W. It is understood that either party has the privilege of withdrawing their approval and re-opening negotiations on sixty days' notice in writing. These rules are to be posted in the shops of the members.

(2) Eight hours' labor shall constitute one days' work. On out-of-town work where no chartered branch of the I. B. E. W. exists the day's work shall be ten hours, otherwise the working rules of that local shall be observed.

(2a) All labor over eight hours per day, except as above, shall be paid for at the rate of one and one-half hours' pay for each hour's work until twelve midnight, after which double time until relieved; work performed on Sunday and legal holidays shall be paid for at the rate of double time. Saturday to be a half-holiday; Saturday work between 12 noon and 5 p.m. to be paid for at the rate of time and one-half, and double time thereafter until relieved.

(2b) All men shall be on the job, ready to commence work, at the regular hours for starting work, which shall be between 8 a.m. and 5 p.m. When workmen are required to report at the shop, they shall report not later than 7.50 a.m., and shall be ready to receive orders or supplies. Failure to comply with this shall result in a reduction in pay for the time lost. If the men are instructed to report at the shop for work and are not sent on a job, they shall be paid for two hours' time providing they report at the office or place designated by 7.50 a.m.

(2c) On shift work night men shall be paid nine hours for eight hours' work. This arrangement to apply only when two or more shifts per day are used on the same job. Shifts to be changed in rotation weekly. Overtime of night shifts

for work over eight hours to be based on regular hourly rate.

(3) The holidays shall be all legal and statutory holidays.

(3a) The help employed shall be divided into two classes: Journeymen and apprentices.

(3b) Apprentices shall be sub-divided into four classes, described as: First, second, third and fourth year, according to time served and qualifications as determined each year upon examination.

(3c) The first half year of the apprentice's time shall be required, as part of the above qualifications, a successful standing in a supplementary electrical course in the Toronto Technical Schools. This course is to be planned by a special education committee of three members, one from each organization and one from the staff of the Toronto Technical Schools.

(3d) Before an apprentice is eligible for examination by joint examining board, he is required to have passed examinations in above course with minimum standing of 75%.

(3e) The first half year of the apprentice's time shall be probationary. At the end of this probationary period, he shall be entitled to membership in Toronto Local 353, I. B. E. W., and to a rate of \$10.00 per week.

(3f) Upon attaining successful standing, periodically as outlined above, he shall be entitled to the following rates of pay:—

Second Year—30c per hour.

Third Year—40c per hour.

Fourth Year—55c per hour.

(3g) After at least three years' continuous service with the one employer and attaining successful standing at the end of the third year, the fourth year apprentice shall be loaned by the employer a kit of tools as listed below.

(3h) After at least four years' continuous service with the one employer, and being successful in obtaining his journeyman's card, the employer shall present to the employee the kit of tools which was loaned to him. Lay-off periods shall not be considered as interrupting the continuity of service.

(3i) List of tools to be comprised as follows:

Brace, hacksaw frame, keyhole saw, torch, 10 in. wrench 14 in. wrench, brace extension, feeler bit, 11, 16 in. and 1 in. auger bits, $\frac{1}{4}$ in. and $\frac{3}{8}$ in. drills, cold chisel, $\frac{3}{4}$ in. wood chisel, claw hammer, cutting pliers, and screw driver.

(3j) The apprentice, when required, shall report to the shop at 5 o'clock to get material so as to be on job with same the following morning at 8 a.m. without loss of journeyman's time.

(3k) A fourth year apprentice shall be permitted to work as a journeyman. Not more than one fourth-year apprentice to every four journeymen in the one shop to be permitted to work under above conditions.

(3l) One apprentice to be allowed to each journeyman or fourth year apprentice.

(3m) Apprentices now in the trade are to be classified as soon as possible by the joint examining board as above, upon determination of their length of service and qualifications.

(3n) Honorably discharged soldiers now taking electrical courses under the Department of Soldiers' Civil Re-establishment shall be entitled on completion of such courses to classification as third year apprentices. If they have had previous experience in the trade, they are to receive credit for such experience.

(3o) It is intended at a later date to provide continuity of employment for apprentices. To that end, no additional apprentices are to be admitted to the trade, except by mutual agreement, during the effective period of these working rules. In negotiating the new working rules to be effective January

6th 1922, the future permissible proportion of apprentices to journeymen is to be agreed upon.

(4) The standard rate of journeyman's wages shall be 87½c per hour, effective on and from January 1st, 1921.

(4a) Should the Toronto District of the Ontario Association of Electrical Contractors and Dealers receive complaints from two or more members concerning alleged incompetence of a journeyman or alleging cause for his re-examination and re-classification, or for forfeiture of his membership in Toronto Local 353, I. B. E. W., the matter shall be referred to the conference board, with complete information. The conference board shall have authority to direct the re-examination of said journeyman by the examining board, and the decision of the examining board shall be final and binding on all parties. If the conference board recommends forfeiture of the journeymen's membership in Toronto Local 353, I. B. E. W., the recommendation, with full information, shall be passed on to Toronto Local 353, I. B. E. W. for final action.

(5) All carfare, other than that to reach the job or shop within city limits and return to employee's residence, shall be paid by the employer, either in cash or car tickets, at his option. All workmen working on jobs beyond the present city limits shall take car going to or returning from work, which arrives at the present city limits as near 8 a.m. or 5 p.m. as car schedule will permit.

(6) The Toronto District of the Ontario Association of Electrical Contractors and Dealers shall appoint two members of Local 353, I. B. E. W. as a joint examining board.

(6a) Any apprentice or journeyman who fails in joint examining board's examination or who fails to report to the joint examining board as notified, shall not be eligible for re-examination for further period of six months.

(7) No employer of labor for the installation of electrical work shall be given any better term or conditions regarding hours of labor, wages per hour, etc.

(8) Employers, in case of work outside of Toronto, shall pay travelling expenses, and all expenses for room and board.

(9) There shall be a conference board, consisting of three members of the Local 353, I. B. E. W., and three members of the Toronto District of the Ontario Association of Electrical Contractors and Dealers. This conference board shall meet at least once each month, or at call of their chairman. All complaints by employer or employee, or covering labor conditions, must be submitted to the board in writing. The conference board shall also work out and put into effect rules governing extra compensation to foremen. Rules and regulations to govern the board's transactions shall be made by the members thereof.

(10) Any journeyman, who shall do any work in violation of the Electrical Inspection Department's Rules, or in such manner so that it will not pass inspection, shall do said work properly at his own time and expense, or pay for same being done. (It being understood that, if such work is done by order of the contractors, the contractor assumes all responsibility as to it being passed by the electrical inspection department, and expense for making work right.) In the event of a journeyman refusing to comply with this provision, the matter shall be referred to the conference board for investigation and if the journeyman be found responsible, the local shall compel him to comply with said provision.

Note:—In continuing the previous rates of wages into 1921, the association desires to bring to the attention of every journeyman and apprentice the urgent need for maximum production as the only possible means to lower cost without lowering wages. The association will be extremely reluctant to take the latter course and believes that costs can be lowered with the market by your own efforts. It is up to you.

Central Stations and Their Relation to the Wiring and Merchandising Business

Better Relations Necessary Between Company and Contractor-Dealer in Interest of Successful Service—Good Contractor a Valuable Asset—Value of Merchandising and Wiring Departments

BY HARRY R. ELLIS

Vice-President and General Manager, Eastern Wisconsin Electric Co., Sheboygan, Wis., in Electrical Review.

Relationship of the central-station company to the business of electrical wiring and the retailing of electrical appliances is one of the questions of utmost importance to the electrical industry today. An early agreement on or settlement of just what that relationship should be is vital to all concerned.

The duties and business of the central-station company should be to furnish current and service. By service is meant not alone a steady and uninterrupted supply to the customers, but advice as to proper illumination, lamps, motors, or any device which uses current for any purpose. The general public always has been and always will be skeptical about any article the central-station company may sell or any wiring it may offer to do, fearing that such contrivances will use the maximum amount of current and not the minimum.

Apparently the majority of people cannot see why a central-station company should want to recommend devices which use the least amount of current when it is the business of that company to sell more current. The public is just as skeptical about advice which dealers may give regarding their own wares. An opportunity must therefore be given to compare views and verify or contradict them.

The gas man's statement regarding the economy of a certain range is taken to a plumber; the coal man's advice on how to burn coal economically is usually taken to a dealer for verification. As a matter of fact, the gas company sells a good and economical water heater. The customer, however, goes to the plumber and pays more for a heater which may prove less efficient—because the plumber does not sell the kind of heater the gas company does, and the customer does not believe the gas man's statement as to grade and economy. If the plumber could have made the same profit on the good heater he would have perhaps sold the customer one like the gas company handled instead of an inferior heater that gave him a wider margin of profit.

This is the age of specialization. The central-station man is advising the manufacturer of chairs to make chairs and not electric energy, maintaining that the power business is a business in itself. Electric wiring, known as electrical contracting, is a business in itself. There are few central-station companies that today are doing this wiring without a loss to themselves. If the central-station company was to charge enough to make, say 10% profit over and above all its expenses, the job would cost more than if it was done by an alert electrical contractor who would then be making more money on it than would the central-station company on this class of work.

There is also the possibility that wiring done by the central-station company may be defective according to the code, since the central-station company, in trying to hold down the cost of the installation would execute a poorer job,

while the contractor is apt to overdo the requirements in order to get as much as he can.

Better Mutual Relations Necessary to Successful Electrical Service

There should be better co-operation between the electrical contractor and the central-station company. The contractor should not expect the central-station company to do all the advertising and soliciting, and merely expect orders to be brought to him on a silver platter. An alert contractor will do his own advertising and thereby profit greatly in conjunction with the central-station company and manufacturers of appliances. Many central-station companies have done as much along these lines as is at the present time practicable for the maximum sale of current.

The electrical contractor cannot be driven out of business by a policy of free, or cost-wiring. He will only be alienated into a condition of antagonism and soon become eligible to join the "anvil chorus." He will only push his other fields the harder. In fact, he has at the present time no small income from installations of isolated plants outside the service lines of the central station. In the meantime, not being in the least interested in anything pertaining to the business of the central-station company, he is in a fit frame of mind to "use his hammer" whenever a present or prospective customer of the central-station company comes to him for information or advice.

Whatever campaign or arrangement the central-station company contemplates, it is good business to get the good will of the electrical contractor—make a friend of him. If he has been fairly dealt with, the contractor is the greatest asset the company can have in a case where a customer, especially one who has just complained about a high bill, goes to the contractor-dealer's store. That contractor will explain and try to satisfy the customer as to the good intentions of the central-station company.

Some years ago a well-known central-station man proposed a triumvirate to consist of the contractor, central station and good will. A new triumvirate might be organized as a trust without capital—a triumvirate consisting of the contractor, the central-station company and the public. The combination of the contractor and central station should be the trust—not to "do" the public, but to enlighten it—that both may tell the same story to the public. From such a combination the greatest benefits would accrue from advertising and other efforts for promotion undertaken by either the contractor or the central-station company.

Thus will be seen the advantages to both the contractor and central-station company when they understand each other and work together. There would be no fear of situations where the contractor might discredit the central-station company before his friends and patrons, nor would the

central-station men discourage or block propositions upon which there had not been an agreement.

Alert Contractor Valuable Asset to Central-Station Business and Policies

There are electrical contractors today whose reputation is such that the architect and builder will readily give heed and be influenced by their judgment. A contractor of this standing can prove a good friend of the central-station company when it comes to a question of installing a private power plant as against buying energy from the central-station company. He is also familiar with electrical installations of every character and in many instances can induce a factory manager to discontinue his private plant and take central-station service, where the central-station solicitor would not be given the opportunity to offer arguments in favor of the advantages such a change might make possible.

As electrical contractors are almost always well equipped to solicit business from possible users of electricity it is of very great importance to the central-station company to encourage an attitude of mutual friendliness. Frequently the contractor will go so far as to confer with, or at least notify, the central-station company when he is asked to bid on an isolated plant.

If the electrical contractor is so valuable to the central-station company, let it also be conceded that to him are due certain considerations from the central-station company. First of all, he is entitled to a square deal. For business reasons as well as justice, fair and generous treatment should be accorded him. If this is done, the contractor in 99 cases out of 100 will pass on to his customers the impression that they, too, may expect a square deal from the central-station company and a prompt and proper adjustment of whatever difficulties may arise between the company that sends the bills and the customer who pays them. The business of the central-station company will grow faster by virtue of having an alert contractor looking after one end of it than it can with the central-station company handling the whole thing alone.

In the case of winning over gas customers to modern installations it should be the understanding that the electrical contractor shall exert his best endeavor to put in a lamp installation before the central-station company takes a hand in the game. The contractor, it is true, makes a certain amount of profit from such installations which the company with an equal amount of effort might otherwise obtain for itself, but as, between an energetic contractor and a central-station company which usually has its hands full of other details, the chances are that the latter would not, after all, make much profit.

The usual club of the electrical contractor is the isolated plant. With good service and fair rates a central-station company need not fear isolated plants. Nevertheless, many a good customer has been lost by the activities of an indiscriminating contractor. The lost customer is usually ready to come back to the central-station service in a few years, but the business lost by the company in the meantime will never be regained. There are a few cases, of course, where the customer is "stung" by the contractor's plant and might result in a good "I-told-you-so" testimonial. Such a customer, however, will not usually admit his mistake publicly because of his business judgment and pride, but will continue to run with the isolated plant, taking his losses for a few years before again going back to central-station service.

The soliciting value of a contractor is worth more than the few extra sales made on account of lower prices. A contractor should make a fair profit on his wiring.

Central-Station Bargains Stimulate Consumption of Electricity

In the sale of electrical appliances it is possible for the central-station company to work what the contractor-dealer

considers an injury to his business. The central-station company is interested in the production and sale of electrical energy. Very often it is necessary in the building up of the central-station load that the company offer a bargain to the patrons and prospective patrons of electrically-operated devices. To make the consumers aware of the benefits resulting from the use of electricity they must often be attracted by some evidence of economy.

Where a campaign is started by a central-station company with a view to the introduction of electrical appliances, the contractor-dealer stands no chance whatever in the matter of meeting the company's prices for the apparatus. In such a case, however, there should be no hard feeling on the part of the contractor.

While it may deprive him of a small profit as a dealer for the time being, every appliance that is sold improves his business as a contractor. It is considered good policy for the central-station company to advertise and make known that it is prepared to do wiring and give estimates, and is especially equipped and prepared to plan lighting or power installations. This will open the way for a customer who receives a bid from a contractor to go to the central station and be advised whether the contractor's figures are excessive.

Wherever the community is sufficiently large to warrant the existence of an electrical contractor, he and the central-station company should get together and work to the same end—to increase the use of electricity. Where the central-station company is a competitor of the contractor it will create friction and the latter, instead of co-operating to increase the central-station load, will seek every opportunity to put in independent and isolated equipment while siding in with the general public in every popular cry against the public utility.

Contractor Should Advertise More and Receive all the Business

The electrical contractor has, perhaps, been slightly deficient in one way; that of advertising in the various available forms. Large advertisers of today are usually found to have been the small advertisers of yesterday.

There are certain things which the contractor-dealer can find it to his advantage to do in "playing the game" with the central-station company. He will find it profitably advantageous to maintain an up-to-date show room in which should be displayed all kinds of devices suitable for the home, business or industrial purposes.

Because the contractor-dealer is more closely in touch with his neighborhood, such a display will be more effective than one undertaken by the central-station company, because the former is aiming to stimulate a very local rather than a general demand. The company should, however, maintain an appliance show room of at least equal importance in a central location.

The public needs education with respect to wiring, and the installation of every kind of appliance, and the desire to secure the benefits of electricity must be stimulated just as in the case of any of the other salable commodities of the present day.

Central-station companies and manufacturers of electrical equipment and appliances should not be charged with the entire responsibility of educating the public to the electrical improvements and devices now available. There is an ever-widening use of appliances for the utilization of electricity, and a growing interest in their useful application to our own every-day needs. If, then, the competent and wide-awake electrical contractor-dealers will do their share in the furtherance of this growth, it will hasten the time when the contractor-dealer, the central-station company and the manufacturer of electrical equipment shall reap the rewards of their efforts, and the public will be happily served.

City of Winnipeg Hydro-electric System Refuses to be Ruled by Electrical Union

Mr. J. G. Glassco, manager of the city of Winnipeg Hydro-electric System, recently told the officials of the International Union that no recognitions would be afforded wage schedules.

Council in special session instructed Mr. Glassco and Mr. F. A. Cambridge (city electrician) to dismiss any employees who continued their outside allegiance contrary to agreement; so on February 14th, twenty-two electricians were suspended for refusing to comply with the order given by Mr. Glassco that they sever their connections with the Electricians' Union, and were given until the next day to obey the order, failing which they would be permanently dismissed; Mr. Cambridge making the same ultimatum to his electricians.

Confronted with the final choice between permanent dismissal from the city service, or renouncing their affiliation to Local Union No. 1037, International Brotherhood of Electrical Workers, seven of the twenty-two suspended workers in the Hydro-electric System resigned their civic pledge, five of the workers in the City Electrician's Department also resigned the pledge, bringing the number of civic employees who returned to the city fold to twelve out of twenty-eight who failed to keep the original agreement. The next day found the remainder back at their jobs with the exception of one man.

Mr. Glassco stated that while he believed in fair treatment of the men, the citizens of Winnipeg had to be protected. He cited where in 1919 the men went out on strike for no reason whatever other than to enforce the trade union principle. This meant that they were shutting off the vital necessities of life upon which the citizens depended. The same thing happened on a smaller scale in 1918 and the time had come when there had to be a show down. The men submitted their case to the Joint Council, but the city council refused to consider the matter as coming within the jurisdiction of that body.

Corrosive Effect of Cinders on Metallic Conduit

We are in receipt of an interesting letter from Mr. F. A. Cambridge, city electrician of the City of Winnipeg, regarding the corrosion of metallic conduit placed in cinders or cinder fill construction fire-proof buildings. Mr. Cambridge points out that it is not as widely known as it should be that under such conditions metallic conduit shows rapid corrosion, and quotes Mr. Dana Pierce and sends a copy of Mr. Pierce's conclusion after he had investigated this matter. Mr. Pierce's letter to Mr. Cambridge contains the following statement:

1. We have had some correspondence on the subject of Conduit in Cinder Fill with representatives of the Conduit Section of the Associated Manufacturers of Electrical Supplies who report that the harmful effect of cinders in fill of any sort should be and probably is widely recognized so that no well-informed architect or constructor would undertake to place such cinders in contact with steel materials, either electric conduits or the structural work of a building. The makers of conduit do not claim that the protective coating whether of enamel or of galvanizing will successfully withstand the action of cinders.

2. If, as I think we may safely assume, this effect of cinders is generally admitted and is recognized by those who have given the subject attention, it would not appear necessary to conduct an investigation, but, nevertheless, it might be very wise to include in the proper place in future editions of the code a prohibition of such use of conduit in order that

those who are either ignorant or careless may be restrained from such use of this material.

3. I have proposed to the Conduit Section that they indicate to me one or two of their members who would be interested to consider the place and working of such an addition to the rules. I do not know that any official or authoritative action on this subject can be taken through any other course, but I have recorded this as an item for future consideration by the Electrical Committee.

Approves Estimate Sheet Submitted

Brantford, Ont.

Editor Electrical News:—

I was much interested in reading the article entitled "Standard Estimate Sheet" in your section for the electrical contractor.

We are strong advocates of a standard estimate sheet and while the form compiled by Mr. Rohleder and his committee differs considerably from what our Brantford contractors have been using, it is very complete and shows that considerable thought has been given to the subject and I want to compliment Mr. Rohleder and his committee for their efforts.

I would, however, like to offer friendly criticism of their method of figuring overhead expense and profit.

I think it has become an accepted fact that overhead expense and profit should be figured on the selling price and not on the cost as shown in this article. Investigation has proven that the average cost of doing business is 25% on the selling price or volume of business and, furthermore, it seems to be agreed that the contractor is entitled to at least 10% profit on the selling price. In this article Mr. Rohleder has figured 20% on the cost and then 10% on the cost plus overhead for profit.

If you ask the average contractor what his cost of doing business is, he will base his percentage on the volume of business; therefore, it will be readily seen that it is wrong to turn around and use this same percentage on the cost.

I would be glad to see this question discussed further so that whatever method is correct it can be firmly established. Apart from this, the committee are deserving of credit for the accurate, business-like way in which they have handled this subject.

Yours very truly,

The Henderson Business Service Ltd.,
C. D. Henderson, President.

Public Service Corporation Shows Higher Income

In spite of the present unfavorable conditions prevailing in industrial circles in the field it serves, progress is shown in the Annual report of the Public Service Corporation of Quebec for the twelve-monthly period ended December 31, last. The gross income of the company, which is a subsidiary of the Shawinigan Water and Power Company, for the year, amounted to \$305,627, an increase of \$42,222 over 1919. In his report, the president, Mr. Julian C. Smith, states that there are signs that industrial activities are recommencing, after a period of depression. Without being too optimistic, he hopes for a normal condition of affairs in a few months' time, in so far as the Public Service Corporation is concerned. The service received from the Shawinigan Water & Power Company has been excellent. The Shawinigan Company has practically completed a second transmission circuit between its plants and the city of Quebec, and when this circuit is completed, the power supplied should be even more reliable than it has been in the past,



BETTER MERCHANDISING



Canadian Electrical Supply Jobbers Meet in Toronto

Joint Session with Manufacturers to Discuss Points at Issue

The Canadian Supply Jobbers' Association held their annual meeting in the King Edward Hotel, Toronto, on Monday, March 7. The meeting was well attended from outside points, most of the delegates remaining over for the following day to visit local electrical equipment factories.

The president of the association, Mr. M. K. Pike, who presided, was re-elected to the same office for another year, as were also the other members of the executive. Mr. J. A. McKay, the secretary, was made manager-secretary.

The companies represented and the delegates were as follows:

Benson-Wilcox Electric Co., London, H. S. Wilcox.
 Canadian Electrical Supply Co., Montreal, G. A. Patterson.
 Central Electric Supply Co., Toronto, M. S. Pierce, Jas. Bell, Walter Warren.
 Electrical Equipment Co., Ltd., Montreal, S. W. Smith.
 Factory Products, Ltd., Toronto; Mr. Langmuir, Mr. Nicholls.
 International Machinery & Supply Co., Montreal, R. J. Hiller.
 The Masco Co. Limited, Toronto, C. A. McLean.
 McDonald & Willson, Ltd., Toronto, G. W. Barber.
 Jas. Moncur Electric Co., Hamilton, J. Moncur.
 Munderloh & Co. Limited, Montreal, J. A. Burns.
 Northern Electric Co. Ltd., Montreal, M. K. Pike, N. S. Richards, L. A. Johnson.
 Northern Electric Co. Ltd., Toronto, W. R. Ostrom, L. P. Stiles, D. C. McKellar, A. L. Brown.
 Rogers Electric Co. Ltd., Toronto, Joseph Rogers.
 John Starr Son & Co. Ltd., Halifax, C. C. Starr.

In the afternoon a joint meeting of jobbers with members of the Electrical Supply Manufacturers' Association (Associate members of Canadian Electrical Supply Jobbers' Association) was held, at which these manufacturers were present:—

Conduits Co., Limited, Toronto, J. H. Hall, president E. S. M. Association.
 Benjamin Electric Mfg. Co. of Can., Toronto, H. S. Balhatchet, F. J. Allen.
 Canada Wire & Cable Co., Ltd., Toronto, T. A. Gass.
 Canadian Drill & Elec. Box Co., Toronto, A. Heald.
 Canadian National Carbon Co., Toronto, Mr. McKenzie, Mr. Walsh.
 Canadian Westinghouse Co. Ltd., Hamilton, N. S. Braden, G. F. Foote.
 Crouse-Hinds Co. of Can. Ltd., Toronto, E. G. Mack.
 Harvey Hubbell Co. of Can. Ltd., Toronto, F. W. Leavitt.
 Majestic Electric Supplies Ltd., Toronto, H. E. Doty.
 National Electric Heating Co. Ltd., Toronto, A. Pritzker, Carl Frankel.
 Smith & Stone, Limited, Georgetown, Mr. Duggan.
 Square D Company, Toronto, C. H. Keeling, Mr. Kaufmann.
 Superior Electrics Ltd., Pembroke, Mr. Harris.

The Vancouver Association of Electrical Contractors Hold Annual Meeting

The Vancouver Association of Electrical Contractors and Dealers recently held their annual meeting and elected officers. It is interesting to note that both the newly elected president and secretary hail from Scotland and further that both were highly trained in marine electrical installation. Mr. W. W. Fraser, president, received his early education with Messrs. King, Brown & Company, Edinburgh, Scotland, for whom he superintended several large installations, both ashore and marine. He finished his technical education at the Heriot-Watt College, Edinburgh, Scotland, coming to Vancouver nine years ago, where for the past five years he has carried on business under his own name at 602 Hastings Street, West. In all that pertains to the welfare of the electrical industry at large and the work of his association in particular, Mr. Fraser can be relied upon to put his shoulder to the wheel.

Mr. J. C. Reston, who was elected secretary-treasurer of the association, received his technical education with the Glasgow and West Scotland Technical College, graduating as an Electrical Engineer and until 1911 was actively associated with that well known firm of pioneers, Anderson & Munro; the firm which by the way installed the first lighting in a residence in Europe. Upon his arrival in this country, Mr. Reston first was appointed to supervise the Gamewell Fire Alarm System in the municipality of South Vancouver, British Columbia, after which he took charge of the electrical work for the shipbuilding firm of Coughlan and Sons, of Vancouver having personal charge of the electrical installation on the first eight steel steamers built by that firm here. In the fall of 1919 Mr. Reston started business for himself, making, in so far as possible, a specialty of marine installations.

Both officers have, with the active aid of the past president, Mr. E. Brettell, done a great deal in rousing the electrical contractors and dealers of Vancouver to the point where they are willing to spend good money and efforts towards making the local branch one of the most progressive in Canada. Keep your eyes on Vancouver as there are some surprises in store for similar organizations coming from the west in the near future.

A New Application for Flood Lighting

Recently the National X-Ray Reflector Company's engineering department received the following letter:

"I live in the suburbs and would like a spot of flood light which I could throw at various points within 100 feet of the house and into the tops of surrounding trees, where during certain weeks of the year, blackbirds roost in annoying numbers."

The X-Ray engineers told him X-Ray No. 51-E Projector would do the trick.

A handsome, substantially-bound new catalog, well illustrated and containing a comprehensive summary of Diamond fibre and its different uses, has just been issued by the Diamond State Fibre Company. This catalog should prove of great interest to manufacturers, engineers and others.

Improve Standard of Lighting

Central Station Company Reaches Public by Systematic Publicity Campaign

"Better merchandising" takes many forms. A campaign to improve the standard of lighting has been conducted during the recent past by the British Columbia Electric Railway Company in Vancouver, B.C. A series of eleven advertisements beginning with the elementary ideas on lighting has just been completed in the newspapers. The series was entitled "Modern Lighting Developments," and included the following subjects: 1, New Ideas on lighting; 2, How many foot candles? 3, Beware of glare; 4, Churches and public halls; 5, Store lighting; 6, Show window lighting; 7, Industrial lighting; 8, Some principles of industrial lighting; 9, Lighting the home—the living room; 10, The dining room and bedroom; 11, Street lighting. Local electrical contractors were circularized and urged to clip out the advertisements and follow them up individually.

The advertisements are written in an interesting way and follow one another logically, and it strikes us that any city or town in Canada would find it good business if the various electrical interests would combine to inform the public in this way. The central station will profit, as it increases the demand for current, and the manufacturer, jobber, contractor, and dealer will all profit in proportion as it means additions to present installations.

The advertisements were all headed with suitable illustrations and occupied a space of approximately 5 in. x 10 in. We reproduce the explanatory matter of the advertisements herewith, believing they will be found of great interest, and may well form the basis of many similar campaigns at other points in Canada:—

* * *

NEW IDEAS ON LIGHTING

The lighting of homes, offices, stores and factories to-day now ranks in importance with ventilation, sanitation and general design. Scientific investigations have been made in recent years to prove that proper lighting has a most important effect upon health, production and trade.

In many ways, the sun has been displaced as an efficient source of illumination in factories and stores, where localized lighting is necessary for safety and to increase production.

The lighting of auditoriums and public buildings is most important in their effectiveness. Proper street lighting is necessary for safety from terrific accidents.

It is our intention to discuss in an impartial way some of the most recent developments in the field of lighting, together with some of the fundamentals which should be observed in the various applications of this science.

In the space at our disposal it is impossible to treat the subject except in a general way. Anyone who has a lighting problem should consult a lighting expert forthwith. It will also be impossible to avoid the expression of opinion on systems of lighting, and these may be questioned, but we wish to assure readers that they have been taken from recognized authorities and from the latest records.

These articles will be published in this paper each Monday and Thursday until the series is completed.

* * *

HOW MANY FOOT CANDLES?

The unit of light intensity is the candle. As this applies to the light source, a different unit must be used to measure the illumination of a newspaper, desk or other working plane. As this varies according to the distance from the source, the unit employed is the foot-candle.

The foot-candle must not be confused with the brightness of a surface. A grey surface lighted to the intensity of one foot-candle will not appear so bright as a white one.

Keeping this standard in mind, compare the standards of illumination set forth in the following table taken from an authoritative source. It should be noted that different goods require different intensities. Thus a cloak and suit depart-

ment of a large store would require higher intensity than the white goods department.

Present Standard of Illumination

	Foot-candles
Auditorium, Church	1.5—3
Armory, Public Hall	2 — 4
School, Classroom, Library	3 — 6
Store—	
Show window	10 —30
First floor department, shop on bright street or corner	7 —10
Other clothing, Dry Goods, Haberdashery, Millinery, Jewelry, etc.	4 — 7
Office—	
Private, General	4 — 8
Drafting Room	8 —12
Industrial—	
For rough manufacturing occupations, such as: rough assembling, rough forging, rough wood-working, ice-making, potteries, lumber mills, tanneries, etc.	2 — 4
For medium manufacturing occupations, such as: medium woodworking, rough machining, rough bench work, automatic machine work, meat packing, paper-making, laundries, bakeries, etc.	3 — 5
For fine manufacturing occupations, such as: fine assembling, leather working, fine wood-working, fine lathe work, tobacco manufacturing, fine sheet metal working, manufacturing light-colored textiles, etc.	4 — 8
For extra fine manufacturing occupations, such as: watch and jewelry manufacturing, engraving, type-setting, shoe manufacturing, enamelling, manufacturing dark-colored textiles, etc.	7 —
Building Exterior	3 —15
Work on dark goods required a higher illumination than work on light goods.	

The next article will be on the subject of "Glare" and will appear in this paper on Thursday.

* * *

BEWARE OF GLARE

The glare which intensifies bright headlights on an automobile produce is just as dangerous when produced by a less intense light if sustained over a long period.

A glance at the sun proves that any extremely bright light coming within the field of vision is capable of producing acute discomfort.

In auditoriums, churches, public halls, etc., care should be taken to avoid any direct rays of light falling upon the eyes of the audience, otherwise, fatigue will result and the effect of speakers will be lost.

The position of lights and the design of fixtures are important factors in the elimination of glare, but attention should also be given to color of walls, intrinsic brilliancy, distance, etc. The use of frosted globes is often desirable if indirect illumination is not used.

The reflecting properties of materials and of walls must be attended to. For a machine shop, more diffused light sources must be used than for a woodworking shop owing to the reflection from metal. Bright walls may produce discomfort unless the light is projected upon horizontal surfaces only. Walls finished in buff, light green or gray reflect about the proper proportion of light. Walls finished in high gloss are not satisfactory from a glare standpoint.

These questions are important in offices and industrial establishments where fatigue has a great bearing upon production. An expert should be employed in every case to lay out the illumination.

The next article will be on "Churches and Public Halls" and will appear in this paper on Monday.

* * *

CHURCHES AND PUBLIC HALLS

The test of the lighting of an auditorium is the feeling of restfulness and the absence of eye fatigue which one experiences after being in the auditorium for some time. If there are any exposed lights within the angle of vision for any length of time, there will be annoyance and the audience will be irritated, restive and unable to listen to a speaker with full concentration.

The problem of lighting churches and such buildings has been solved by the indirect lighting fixture, which throws the light upon the ceiling, thus diffusing it throughout. These fixtures may be made in harmony with the decorations and architecture.

There should be no exposed wall fixtures on any side of

the auditorium faced by any part of the audience, more especially on the side occupied by the speaker's platform.

Where lighting is required on the walls, it is possible to have indirect wall fixtures which overcome the objection to glare and direct rays of light.

As much care should be given the lighting of a hall as to the acoustic properties. A small expenditure on modern lighting fixtures will be amply repaid by the increased comfort obtained. In addition, care should be taken to obtain the proper coloring in decoration in order to harmonize with the lighting effects.

The next article will be on "Store Lighting" and will appear in this paper on Thursday.

* * *

STORE LIGHTING—MAXIMUM RESULTS

In lighting the modern store, the same attention should be given to the customer's comfort and to the general decorative effect as in the auditorium.

Light sources of intense brilliancy should be properly shaded and color-modifying glass may be used, although at a sacrifice of light. This may be offset by using larger units with the increased efficiency thus obtained.

For matching silks and other materials which are to be used outdoors, up-to-date merchants are providing the new "daylight" type of lamp at a number of locations in their stores, such as in front of mirrors, preferring in many cases the softer, yellow light of the ordinary lamp. However, if the wares are to be worn altogether in artificial light, it may not be necessary or desirable to bring out the daylight colors.

Store illumination varies from 4 to 10 foot-candles in brilliancy, depending upon the class of merchandise.

Modern lighting will mark your store as being progressive, reliable and of high quality. Good lighting is as necessary to your success as suitable fittings and show windows.

The next article will be on "Show Window Lighting" and will appear in this paper on Tuesday.

* * *

SHOW WINDOW LIGHTING

Show windows can be made the best mediums for advertising goods. But show windows are effective only when properly illuminated, both day and night.

While different classes of merchandise require different treatment, the following principles, as laid down by the National Electric Light Association, may be applied to all classes of business.

Conceal all light sources to avoid glare and resultant distraction and annoyance; in general, the only lamps that should be visible are those of very low brilliancy used for decorative purposes.

Fit all lamps with efficient reflectors to get the maximum light on the goods for the minimum expenditure of power.

Choose reflectors which distribute the light in such a manner as to illuminate the display uniformly. A high, shallow window obviously requires a different type of reflector than a low, deep one. A window likely to have a high dress should be lighted differently from one in which the material is always close to the floor.

All mechanism of lighting should be hidden from the observer by some sort of screening device.

Use a background of dull finish to prevent reflections of light sources.

A light-colored backing makes a window appear brighter with less illumination than when a mahogany, walnut, or similar backing is used. Warm grey, neutral buff, cream or ivory have been very effective for this purpose.

The show window is a miniature stage and similar methods of lighting apply. Make use of the same color effects as the theatre uses and give every layout special attention.

The next article will be on "Industrial Lighting," and will appear in this paper on Thursday.

* * *

INDUSTRIAL LIGHTING AND "OVERHEAD" REDUCTION

Tests made under most critical inspection show that production has been increased as much as 10 to 30 per cent. by proper factory illumination.

Spoilage has been reduced 25 per cent. by the same means; quality has been improved; workmen have obtained better working conditions, and accidents have been greatly reduced.

The low cost of current to-day makes it well worth while to increase the efficiency of factory lighting by having it properly designed, by having the proper intensity for the

class of work and by installing the type of lighting best fitted for your requirements.

Industrial lighting has been given official recognition in numerous states south of the line and factories have been required to bring their lighting up to certain standards fixed by law.

It is not possible to reprint the long schedules of lighting as applied to various industries, but we suggest that industries obtain expert advice, for which they will be well repaid in increased profits.

The next article will be on "Some Principles of Factory Lighting," and will appear in this paper on Monday.

* * *

SOME PRINCIPLES OF INDUSTRIAL LIGHTING

Modern practice is towards general units in factory lighting, uniformly located throughout the room, rather than towards localized lighting with single units at each machine.

The localized units are apt to bring about sharp contrasts in intensity; the lamps are subject to theft and can not be properly adjusted in their reflectors; the installation cost is generally high and the cost of operation on account of spoilage, etc., excessive. If localized lighting is necessary, some general lighting should be installed.

The main factors in choosing proper general lighting are as follows:—

1. Selection of a suitable lighting unit.
2. Selection of the desirable intensity of illumination.
3. Determination of the coefficient of utilization; that is, the percentage of total light from the lamps effective on the work.
4. Determination of total light flux to be supplied by the lamps.
5. Determination of location and number of outlets.
6. Determination of the size of lamp for each outlet to provide most nearly the amount of light desired.

It is obvious that the shape and size of the room has a bearing on the question because of the absorption of light by walls.

The next article will be on "Lighting the Home—the Living-room," and will appear in this paper on Thursday.

* * *

LIGHTING THE HOME—THE LIVING ROOM

The increase in intensity of modern lamps has made shades and concealed lights imperative. As in all other lighting, all glare must be eliminated, otherwise the effect will be tiring.

The lighting of the living-room should be arranged so that it may be varied according to the occasion and the mood. On occasions, when there is company, it may be necessary to flood the room with light. But at other times, the intensity of such illumination, especially if there is glare present, will be annoying if endured for some time.

One of the most satisfactory methods of lighting the living-room is by means of portable lamps, capable of throwing the light to the ceiling or the floor as desired. Several of these placed in a room will have a distinct artistic effect not obtainable with fixed ceiling lights which are apt to become monotonous.

In a living-room 14 feet by 24 feet, there ought to be at least six baseboard outlets to which to attach such portable lamps.

Wall-brackets are sources of discomfort when not well shaded. They are nearly always in the field of vision. When heavily shaded, as they must be, they cease to be sources of light and become ornaments.

The possibilities of decorative lighting for the home have hardly been realized yet. For a small expenditure, effects unobtainable otherwise can be brought about by the intelligent use of light. There should be as much care given to the proper selection of lighting fixtures as there is in furniture. Your future needs should be anticipated by an adequate installation of baseboard outlets.

The next article will be on "The Dining-room and the Bedroom," and will appear in this paper on Monday.

* * *

LIGHTING THE HOME—THE DINING ROOM

The lighting of the dining-room presents a different problem from the living-room. The same principle holds good, however, that direct light must not be allowed to meet the eye.

Two types of fixtures may be generally employed—the dome and the group of pendent shades. The main requirements of such lighting is that they should be hung low enough to prevent direct light reaching above 12 to 14 inches higher than the edge of the table.

To obtain this effect, the lamp in the dome should be fixed as close to the top of the dome as possible. In the case of individual shades, they ought to be so shaped that practically all the light is projected downward, giving the intensity of illumination to the table.

Unlike the living-room, light in the dining-room should be focussed on one spot—the table. Candelabra and wall fixtures are of use only for decorative purposes but must not be allowed to over-balance the primary effect on the table.

Cove lighting, using colored lamps, often of different colors is a delightful adjunct to dining-room decoration. Baseboard or wall outlets should be provided near the buffet for attaching electric appliances to.

The Bed Room

In designing a new house, the arrangement of the furniture should be decided upon before windows and lighting fixtures are located. Having the position of the dresser, wall-brackets should be placed on each side, but at least five feet apart to reduce the glare. A small ceiling fixture is desirable and there should be a baseboard outlet for a portable lamp, which may be decorative or useful.

The next article will be on "Street Lighting," and will appear in this paper on Thursday.

* * *

STREET LIGHTING

Street lighting has taken several important steps forward during the last few years. The low intensity cluster standards, as in use in Vancouver, have been superseded by the high intensity, luminous arcs, flame arcs, or nitrogen-filled tungstens.

In San Francisco, Los Angeles, Salt Lake City and other cities, the "Intensive White Way" has been introduced, using from one to three high candle-power lamps on each standard.

As these standards are high enough to be above the angle of vision, there is no glare as is present with the low cluster lights.

At the same time, they make the street like day, allowing features to be recognized at a distance, making bright headlights on automobiles unnecessary and cutting down the number of traffic accidents.

By means of mechanical devices it is possible to reduce the candle-power in use at midnight or any other hour that may be chosen.

In residential streets where there are trees, it is customary in modern cities to adopt a smaller standard bearing one lamp. This is set on the curb and makes residential street lighting much more efficient than the Vancouver plan of having a light only at corners.

The rate for electricity in the cluster lights in Vancouver is only two cents a kilowatt hour, a discount of 25 per cent. having been granted during the war and since. Street lighting is the cheapest protection from crime and accident that can be obtained.

More Dealers Approve Slogan "Buy Electric Goods in an Electric Store"

Amherst, N.S.

Editor Electrical News:—

The slogan "Buy Electric Goods at an Electric Store" is good, but in these maritime provinces of ours we would suggest that manufacturers, jobbers, contractors, dealers and insurance companies would get together and have a law passed that would call a halt to the man with a screw driver, pair of pliers, a coil of telegraph wire and his pockets full of Japanese fixtures, going from house to house committing murder; for in lots of cases that is what it means. The loss by fires these last two years has been outrageous; insurance rates have jumped to the sky, so that it is a question which is the cheaper, to pay insurance premiums or take your risk. I think that we are within the limit when we say that 50% of the trouble is caused by the man that peddles electricity from house to house.

Yours very truly,

W. B. Bowser & Son

407 Spadina Ave. Toronto

Editor Electrical News

"Buy electric goods in an electric store" is, in my opinion, the only slogan for the electrical dealer at the

present time when every second store seems to be handling electrical goods, whether the sales person knows how to bring out the merits of the article or not.

In short I may say would like to see Electrical Dealers adopt this slogan and advertise in a uniform way.

Hoping to see further steps taken in this direction, I remain,

Very truly yours,
J. E. Day.

A Good Suggestion

Belleville, Ont.

Editor Electrical News:—

With reference to the insertions throughout your paper of February 15th advising the public to buy electric apparatus at electric shops, why do you not also start a campaign advising all electric dealers to call their places electric shops? For instance, we have McDonald & Wilson, Benson & Wilcox, etc. It was the McDonald & Wilson Electric Shop, Benson & Wilcox Electric Shop, it would enable the public to know where the electric people were located.

Yours very truly,
Oswald H. Scott,

Hoover Enthusiasts in and Around Toronto Lay in Stock of Enthusiasm for 1921 Sales Operations

The Hoover dealers of the Toronto district, with the veteran J. M. Skelton in the chair, held a very successful get-better-acquainted, get-more-enthusiasm banquet in the Carls-Rite Hotel, Toronto, on the evening of Tuesday, March 1st. In addition to a splendid turn-out of Toronto representatives, a half dozen enthusiasts came over from Hamilton. These latter included Mr. Thomas F. Kelly, sales manager of the Canadian company. Mr. Martin L. Pierce, of the Department of Research and Promotion, had also come up from head office to address the convention.

Hoover salesmen are an enthusiastic, aggressive bunch of fellows. One sees it in the way they put over their sales campaigns, in the snappy and enthusiastic individuality they throw into their entertainment program, and, not the least, in the originality they display in their entertainment as well as in their business methods. As an example of this, the Hoover dealers are not content with the wording of the standard song sheet we all know so well—nor for that matter do they always follow the standard tune too closely. On the occasion in question a special sheet had been prepared parodying some of the best known songs, of which the following is typical:

To be sung to the tune of "Katy."

Hoo-Hoo-Hoo-Hoover, wonderful Hoover,

You're the only k-k-k-cleaner I adore.

While the b-b-broom pines, in the cow shed,

I'll push you across the p-p-p-parlor floor.

Following the banquet Mr. Skelton lost little time in coming to the main business of the meeting. He reminded his hearers that the Canadian factory, which had been built at a cost of approximately three quarters of a million dollars, was now equipped to turn out three hundred machines a day. This meant an output of 90,000 machines in 1921, and, on a supposition that half of this amount would be exported to England, this left 45,000 to be sold in Canada. Of this amount 5,400 had been allotted to Toronto and he reminded them that it was their business to see that this number of machines was sold. He then called upon Mr. Pierce to address them on the subject of "Hoover Profits."

Mr. Pierce made a good point when he drew attention to the rapid turnover of the vacuum cleaning machine com-

pared with other selling propositions. He quoted names of firms that had turned their Hoover cleaners seventeen, eighteen and even twenty times a year. The average was about twelve times, which means that a dealer need only stock, on the average, a sufficient number of machines to run him one month. This reduces his capital expenditure very materially and increases his profits accordingly.

Mr. Pierce spoke also of the value of the Hoover machine as a creator of good will, on account of the small number of machines that give trouble and, in consequence, the great number of friends the machine makes for the retailer. He spoke also of the large uncultivated field yet open to electrical appliances, and urged the salesmen present to drive as hard as they possibly could during the coming year, as they could do this with the full assurance that however hard they worked they would not be able to harvest the full crop.

Mr. Thos. F. Kelly also addressed the convention. He referred encouragingly to the prospects for 1921, and enthusiastically to the personnel and the organization of the Hoover Company. He outlined, also, the extent of the advertising campaign which the company has prepared, which will include newspapers, street cars, bill-boards, dealer helps, etc., and he again, as Mr. Pierce had done, emphasized the great possibilities in electrical merchandising as compared with merchandising in other lines of trade. In this connection he quoted figures recently published in the Electrical News, which showed that only five per cent of wired homes in Canadian towns and cities are provided with vacuum cleaners.

A Few Dont's for the Electrical Dealer

Don't stand around the store with your hands in your pockets. Your hands were made for work, and your pockets for the proceeds thereof.

Don't talk to your customer with a cigar in your mouth. She may class you as a plutocrat and trade elsewhere. In any case, few men, if any, are enhanced in their personal appearance by sucking the end of a weed.

Don't turn your store into a nursery for the amusement of those "little dears" that are to perpetuate your name. Your customer may have gone shopping just to get a rest from the cooings of her own "little darlings," and it is not fair to her to advertise herself as an electrical dealer when in reality you are running a creche.

Don't keep any human freaks in your store to attend the public. It requires salespeople with all their faculties, and with a clean upstanding appearance to put the electrical service idea across to the public.

Don't permit a clerk to empty out a vacuum cleaner in your front store, and clean the brushes with a hairpin borrowed from her coiffure. The writer happened into an electric store recently when this operation was under way, and one party said afterwards that he was uncomfortably reminded of the nights he spent hunting "big game" on the western front.

Don't run around your store shouting at your clerks for change, when your customer hands you a greenback of large denomination in payment of a small purchase. If you haven't the change, ask your customer to wait a few moments, while your clerk goes out to get it for her. That kind of service appeals to her.

Don't forget to smile once in a while. If you can't do that at least try to fix your facial expression in pleasing proportions. There are always museums around to exhibit statues.

Don't wail about depression. Radiate "good business."

Trade Notes

Mr. Thos. Jackson, 11 Sorauren Ave., Toronto, has returned from a visit to the old land.

Snider Bros., 2815 Sixth Ave. W., will shortly let contract for electric wiring and fixtures for a \$9,500 public garage in this city.

Mr. N. McLeod, 690 Danforth Ave., Toronto, Ont., has been awarded the contract for electrical work on two bungalows recently erected at Glebeholme Boulevard.

Tenders were received up to March 11th by the New Brunswick Electric Power Commission for the construction of a generator station and intakes at the Musquash power development.

Owing to ill-health Mr. J. G. Glassco, manager of the city of Winnipeg Hydro-electric System, has been ordered by his physician to take a two months' vacation. He is now enjoying the southern climate.

The Cunningham Electrical Co., 209 8th Ave. W., Calgary, Alta., has been awarded the contract for electrical work on a Technology & Normal School recently erected at Riley Park, Calgary, at a cost of \$600,000.

The Jenkins Electrical Co., 339 Main St., Vancouver, B.C., has been awarded the contract for electrical work on the Strathcona School, corner Pender E. and Princess Sts., Vancouver, which was recently built at a cost of \$50,000.

The Wagner Electric Manufacturing Company, St. Louis, Mo., announces the removal of its Boston office and service station to 342 Newbury St., where they will occupy the entire building. Mr. Brooks Faxon will continue in charge as district manager.

According to an announcement made by chief engineer F. A. Gaby of the Ontario Hydro Commission, Chippawa power will be ready for delivery by September 1st. Considerable delay was experienced in the delivery of two shovels, and at present the work is 15 days behind the plans. However lost time is gradually being made up, and optimism prevails that the September 1 date will be a reality.

An interesting letter, comes from A. F. Holmes, town engineer of Strasbourg, Sask., telling briefly how he turned a deficit of \$1400 a year in his little plant into a surplus of \$900. Strasbourg has a municipal producer plant comprising a 50 h.p. gas engine which is belted to a 37 kv. a., 3 phase, 60 cycle, 2300 volt generator. Mr. Holmes reduced the consumption of coal from 130 tons to 80 tons, and in the following interesting letter tells how it was accomplished:

Announcement is made in Commerce Reports that the United States Bureau of Commerce has placed on file in their New York district office copy of the specification of the Hydro-electric Engineering Co., Ltd., Gisborne, New Zealand, for hydro-electric machinery for the Waikohu hydro-electric scheme near Gisborne. The specifications cover two a.c. generators, each 2,500 kv.a. 11,000 volts, 50 cycle, 500 r.p.m., and two 100 kw., 125 volt d.c. Pelton driven exciters direct connected to two 100 kw. induction generators. The hydraulic specifications cover two 3,600 h.p. Pelton wheels directly connected to the above generators and operating at 500 r.p.m. under a net effective head of 640 to 680 feet, and the two 145 h.p. Pelton wheels for the exciters. Tenders on these specifications will be opened at the office of the above company March 31, 1921.

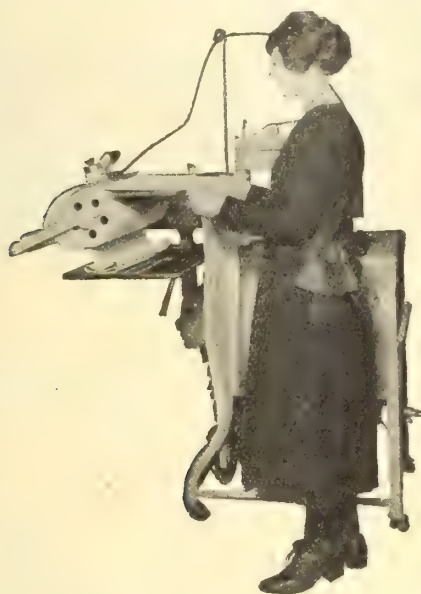
Obituary

Mr. Joseph N. Tallman, president of the Tallman Brass & Metal Company, Hamilton, Ont., died in that city recently at the age of 73 years.

Newest Developments in Electrical Equipment

Combination Washer and Ironer

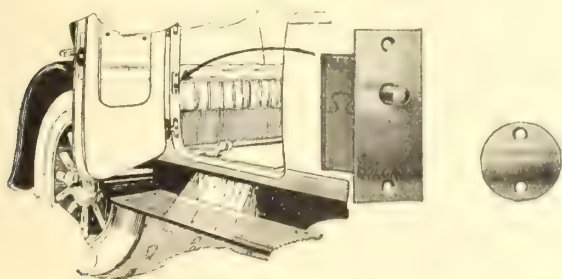
The cut herewith illustrates the Bauer combination clothes washer and ironer. This combination washer and ironer is a 3-in-1 machine: washer, wringer, ironer. The ironer is operated by the motor and connected by the same snap switch that operates the washer. The ironing surface of the roll will accommodate sheets, tablecloths and other large articles. Mangle shoe is 22 inches long. One end of



the ironer can be left open, permitting the pressing of cuffs, ruffles, etc. Wringer and ironer will operate in the usual way and can be swung entirely around to any desired position. When operating mangle, wringer is in number one position and sets at an angle of about 90 degrees. The mangle shoe is operated by a lever conveniently located, and when desired to clean or wax, can be readily thrown back. This machine is manufactured by the Vulcan Mfg. Co., Kansas City, Mo.

Bryant Automobile Door Switch

For automatically illuminating the running board or step and the entrance to closed automobiles, the Bryant Electric Company has developed this single button push switch which operates automatically to close the circuit and light the inside lights when the car door is opened. The shell, within which is fastened the switch mechanism, is of sheet

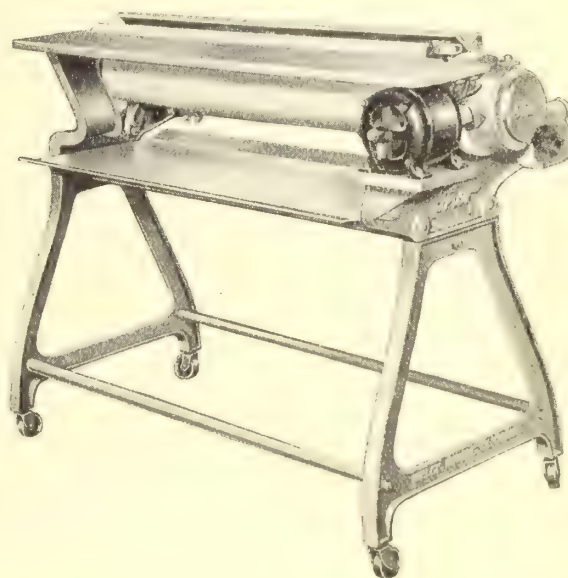


brass with heavy fibre back to form the insulated base for mechanism and screw terminals. This shell is of the smallest practical dimensions—1" x 1½" x ¾" so as to minimize the size of recess hole necessary to cut into door frame. The

switch proper is of the standard knife blade contact type as used in Bryant switches for 110 volt house service with phosphor-bronze contact members. A coiled spring of piano-wire furnishes the force close switch (and the circuit) when button is released by opening the door. A round, polished plate is furnished for fastening to inner surface of door to serve as strike plate for button. This prevents the marring of finish on door. The rating of this switch is such that it will work satisfactorily on any auto lighting circuit, from 4 volts up without danger of injury to the switch.

The New Thor Ironer

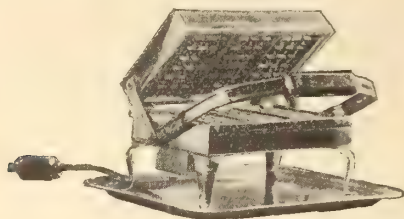
The new Thor Electric Ironer is described by the manufacturer, the Hurley Machine Company, as representing an entirely new mechanical departure in electrical home labor saving appliances. This new ironer removes the last bit of work from ironing, for the operation of the ironer itself is automatic. A touch on a small lever, conveniently placed on the feed board, throws the shoe into gear with the motor and the shoe moves smoothly into one of three open positions or into the closed position, as the operator may desire. Two buttons placed on the control lever are shifted up and down, according to the position into which the shoe is to be moved. The operation is extremely simple and requires no more effort than turning an electric switch. The operator is thus relieved of the exertion and time required in operating the shoe by hand or foot pressure and the hands are free to guide the pieces being ironed. This complete control of all operations with a touch of the finger, furthermore enables



the operator to iron when sitting as easily as when standing and without the necessity of getting up for any of the operations. For the further convenience of the housewife, the roll is given two speeds, one a standard speed of eight feet per minute for heavy pieces and the other of 12½ feet per minute for handkerchiefs, towels and other light pieces. Another feature of equal importance from a mechanical standpoint is the direct shaft drive which eliminates all troublesome belts and pulleys. All gears are enclosed and run in lubricant. No oiling is necessary. The supporting arm at the left end of roll is built so as to permit easy ironing of not only collar and cuffs, but also ruffles and pleats. The demountable frame is built on the three point suspension principle. This is to insure an even pressure of the shoe against the roll, even though the floor upon which the machine rests is uneven. Large swivel casters permit the ironer to be easily moved.

Electric Waffle Iron

A new electric waffle iron has been placed upon the market by the Westinghouse Electric & Manufacturing Company. Simplicity and ease of operation as well as sturdiness



are claimed as features of this waffle iron. The opening of the iron is accomplished by simply pulling down the handle and the closing is accomplished by raising the handle. The iron has a highly polished finish and is equipped with a through switch and tray.

A Midget Motor-Connector

For use on portable motor-driven devices such as massage machines, vibrators, sewing machines, vacuum-cleaners and the like, The Bryant Electric Company have developed the Midget Spartan Connector shown herewith. This connector is furnished in two parts—the plug or “cap” having parallel blades for fastening permanently to the motor, the receptacle being attached to the portable cord that supplies the current service wires. Both parts are made of molded



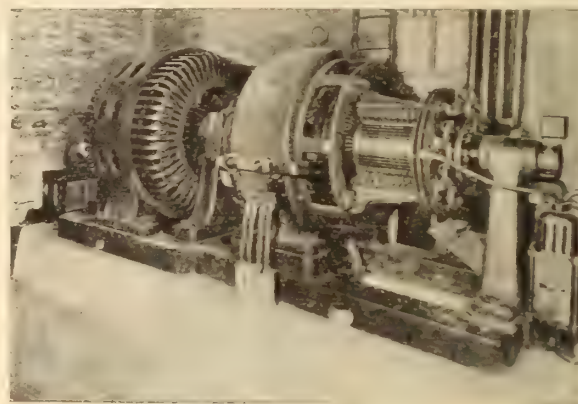
insulation. The receptacle is made of two pieces which are fastened together by means of two screws after the flexible cord is connected to the concealed binding screws at the base of the recessed contact blades. The outside diameter of the cap is 1 1/8 inches, while the receptacle or connector body is 1 3/16 inches diameter by 1 inch in length. For motors where polarity connection is essential, the cap is furnished with none-reversible blades—one large blade to fit a large slot in connector, so that it is impossible to reverse the connections.

Automatic Sub-station for Light and Power Service

There has recently been placed in operation by the St. Paul, (Minnesota) Gas Light Company an automatic sub-station supplying power to the Edison three wire distribution system. The equipment in this station which is of Westinghouse manufacture consists of a 500-k.w., 250-125 volt direct-current compound, commutating pole, compensated generator directly connected to a 4000 volt, three phase, 60 cycle, 1200 rpm. synchronous motor together with complete automatic switching equipment. This sub-station is located in the sub-basement of the new Hamm Building which houses the new Capitol Theatre, devoted to the cinema art. Also, in addition to many shops and floors of offices, there is operating, in the first basement, the St. Paul Amusement Company devoted to bowling and billiards.

To supply this establishment with service from the Light Company's network, it would require not only additions to the capacity in an existing sub-station, but the addition of copper to the distributing network as well. In the nearest sub-station, no space is available for the installation of an additional unit. The automatic sub-station, designed to give to this building a preferred service, solves the problem. During periods of light load, the sub-station is idle, the

building being supplied from the Edison voltage below a predetermined value. The equipment receiving a starting impulse from a contact-making voltmeter, puts the sub-station into service. Operation of the station is continued until the load drops below a predetermined value and remains at or below this value for a given length of time when the station is cut out of service by the action of a small motor-



Motor Generator Equipment.

operated timing relay. The system direct-current voltage is now above the setting of the contact-making voltmeter, so that the station remains idle until dropping network voltage indicates further demand.

While the sub-station is in operation, it is paralleled with the network until the current to it is in excess of one half the capacity of the machine when a small amount of resistance is cut into series with the feeder, thus dropping the voltage to effect a dropping load. This is accomplished by the functioning of direct-current, reverse current relays



Switchboard in Automatic Station.

controlling the operation of the electrically operated contactor switches. When the sub-station is idle, the current inflow to the building from the network is not limited. It is thus seen that this building receives a preferred service. An outage on the direct-current network leaves the building to be supplied from the sub-station. Conversely, an outage of the sub-station leaves the building to be supplied from the network. This combination thus establishes very good voltage regulation of the service supplied to this location.

Protective features similar to those supplied for railway automatic sub-stations and other features peculiar to this type of equipment afford complete protection to the apparatus.

The success of this equipment as shown by the initial operation is already assured. It demonstrates a new ap-

plication of automatic switching which opens the way to perhaps even a greater field than any that has so far entered with this class of apparatus.

Is Current "On" or "Off"?

An indicator that tells at a glance whether the current is "on" or "off," for use with electrical devices of every kind, having a consumption of less than 700 watts, and connected to the lighting circuit, has been placed on the market by the Berghman Company of Chicago. The device can also be



used as a socket extension when, for example, a narrow shade is to be used. The indicator consists of a solenoid type electro magnet set in the upper end of the tube and connected in series with the appliance and with the line. A small armature with a pointer attached to the lower end is placed in the solenoid. When the electro-magnet is energized, the armature is drawn up and the pointer indicates "on." When the current is broken the armature falls and the pointer indicates "off." The appliance is inserted in an ordinary lighting socket and has a socket at its lower end for engaging the plug of an electrical appliance.

The Lightning Rod Act

A bill will shortly be brought before the Ontario Legislature to place restrictions upon the sale of apparatus designed to protect buildings against damage by lightning. The bill is entitled "The Lightning Rod Act," and provides for extensive penalties against firms or individuals engaged in the sale of such apparatus who do not comply with the regulations. The bill provides for a fee of \$50 to be paid by firms engaged in selling lightning rods, and an additional 80 cents for every \$100 received from sales. The apparatus must bear inspection and be passed by the Fire Marshal! Each agent must pay a fee of \$2 a year and must act for one firm only. The agent is made liable to a fine of \$200 for infraction of the regulations. It is further set out that, in the event of damage to a building properly installed with lightning protection, the firm selling is liable to return of the money paid for the rodding of the building or to pay for the damage done. To insure this each firm must deposit securities of \$10,000 with the Fire Marshal.

The Clifford Electric Co., 21 Ontario St., St. Catharines, Ont. have been awarded the contract for electrical work on a residence recently erected at 16 Marquis St.



Mr. T. J. McFadden, who after factory and office experience with the Diamond State Fibre Company of Canada, Limited, at Toronto, is now on the Western Ontario sales staff of the same company.

Co-operating in Nova Scotia

Halifax has now fallen in line and has formed an electrical association to promote interest and co-operation in the province of Nova Scotia. Mr. W. Murdock, manager of the Northern Electric Company, has been made chairman, with a strong committee appointed to work with him. The association is made up of representatives of every profession, trade and industry associated with the electrical business of Halifax. With the new water developed electricity being brought to Halifax, electrical men hope to make it one of the great electrical centers of Canada.

"Sectional Individual Motor Drive for Paper Machines" is the subject of Leaflet 1933, that is being distributed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. This leaflet describes and illustrates the sectional individual motor drive, which has been developed by the Westinghouse Company to assure increased production, decreased maintenance, greater reliability and durability in machines for the production of paper.



While there is electricity there "still" is hope. This cartoon accompanied an Electrical News announcement in a recent issue of the "Goblin," the new Punch of the University of Toronto.

Hand Book on Storage Batteries

The William Hood Dumwoody Industrial Institute of Minneapolis have published a practical handbook on storage batteries, written by C. J. Hawkes. The Dunwoody Institute gives courses of instruction chiefly to workmen who elect to attend evening classes. The instruction is given in a series of short talks, each bearing on some particular part of the trade. This book on storage batteries was developed in this way. Its contents may be gathered from the following chapter headings: History of the storage battery; chemical action; characteristics of lead cells; characteristics of nickel-iron cells; efficiency; manufacture of parts; assembly and electrical treatment; care and operation; tests and inspection; internal symptoms; repairs; storage; design; auxiliary apparatus. Bound in stiff cloth covers, 160 pages, well illustrated.

Hints and Helps

Some time ago the British Aluminium Company published a series of booklets entitled "Facts and Figures" containing data on various forms of aluminium in a compact, loose-leaf pocket form. A companion series called "Hints and Helps" telling the every day methods of working this metal is now being distributed. Four of these series to hand are as follows: No. 1—"Aluminium in the Foundry." No. 2—"Aluminium Spinning and Press Work." No. 3—"Aluminium Machine Shop Practice." No. 4—"Aluminium Finishing Processes." These booklets are nicely gotten up with stiff paper covers, size about $4\frac{1}{2} \times 6\frac{1}{2}$ inches, so that they can be carried in the pocket. At the same time they are not too bulky to be filed with "Facts and Figures" in the original pocket book.

The Canadian Electrical Supply Manufacturers' Association will hold its Annual Meeting in Montreal, at the Windsor, on Thursday, March 31st.

Joins Society Elec. Development

President W. W. Freeman announces officially that Mr. William L. Goodwin joined the staff of the Society for Electrical Development on March 1st in the capacity of assistant to the president.

Repair with "Carricite"

A new product called "Carricite" has been placed on the market by The Carricite Company, Chicago. This is a substance for repairing burned out electric elements of every kind. The process of mending is very simple. Simply bring the burned out ends together, making a good mechanical connection, turn the current on at high heat and apply "Carricite" at the splice. It is claimed that this material is proving very valuable in the repair of range elements, which probably burn out more frequently than the elements of any similar appliance.

M. Beaudett, electrical contractor, 835D Notre Dame West, Montreal, has purchased the business of the Surrey Electrical Co., 243 McCord St., Montreal, and will carry on this business with an up-to-date stock of fixtures and electrical supplies in addition to, and in connection with, his business on Notre Dame.

New Direction Finding Station on Atlantic Coast

A fourth direction finding station for the Naval Service of Canada, radio branch, located at Red Head, was officially opened on March 1st. The other stations in operation are located at Chebucto Head, Canso, and Cape Race. The position of the new station is $45.15.05$ north and $66.0.50$ west, and vessels headed for St. John will obtain their bearings from this point.

Taking Another 19,500

The Niagara Falls Power Company has been granted a fifty-year license by the Federal Power Commission to use 19,500 cubic feet a second of 20,000 cubic feet of water permitted by a treaty with Canada to be diverted from the Niagara River above Niagara Falls.

Dr. Stansfields Wins Medal

At the meeting of the Montreal Branch, Engineering Institute of Canada, held on March 3rd, it was announced that the Plummer Medal for the best metallurgical paper in 1919 had been awarded to Dr. A. Stansfield, for a paper on "Electric Furnaces."

Hevi-Duty Electric Furnaces

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., have been appointed exclusive sales agents in the United States and Canada for the line of Industrial Type Hevi-Duty Electric Furnaces, manufactured by the Electric Heating Apparatus Company, 123 Sussex Avenue, Newark, New Jersey. The standard heavy duty industrial furnaces include 12 different sizes from 18 inches wide, 24 inches long, $13\frac{1}{2}$ inches high, inside dimensions, capacity 22 kw., up to 32 inches wide, 72 inches long, 16 inches high, capacity 80 kw., either automatic or non-automatic temperature control. This line will be extended as developments warrant.

New O-B Catalogue

The 1921 edition of the general catalog of the Ohio Brass Company, Mansfield, O., is ready for distribution. This is catalog No. 18, and deals in a most comprehensive way with high tension insulators, trolley line materials, rail bonds and tools, third rail insulators and car equipment specialties of every kind. The catalog is, in effect, a treatise on electric railway equipment. It comprises over 600 pages of splendidly illustrated matter very thoroughly catalogued and systematically arranged. Valuable tables and general data occupy a number of pages in the appendix. This catalog should find a prominent place on every electric railway man's book shelf.

The Canadian Westinghouse Electric Co. have issued two dealers' catalogues 8-C and 8-D, describing electric household ware, including automatic ranges. Also catalog 18A dealing with Westinghouse electric fans for 1921. Both these catalogues are fully illustrated.

Messrs. Nozon Bros., 104 Frizzell Ave., Toronto, have been awarded the contract for electrical work on an apartment house erected on Grimthorpe Road, near Atlas St., Toronto, at a cost of \$18,000.

The Canadian Electrical Association will hold their annual convention in the Chateau Frontenac, Quebec City, Que., June 15-16-17.



Electric Railways

Model of Traffic Ordinance Adaptable to Canadian Cities

**Mr. Arthur Gaboury, Superintendent Montreal
Tramways Offers Valuable Suggestions to
Electric Railway Men**

In 1919 the Executive Committee of the "Transportation and Traffic Section of the American Electric Railway Association appointed a committee to consider the preparation of a code of traffic principles. This committee included in its membership Mr. Arthur Gaboury, superintendent of the Montreal Tramways Co. The work of this committee has continued up to the present time.

At the recent convention, in Ottawa, of Canadian electric railway men, Mr. Gaboury presented for the consideration of the delegates a code of traffic principles, or as the paper was termed, a "Model of Traffic Ordinances adaptable to Canadian Cities." These Traffic Rules are much the same as were approved at the last annual convention of the American Electric Railway Association, only such changes being made as will adapt them to Canadian cities and conditions. Mr. Gaboury's paper is as follows:

Section 1—DEFINITIONS

Wherever in this ordinance the following terms are used they shall be held to have the meanings given them, as follows:—

1. "Street." That part of a public highway intended for vehicles.
2. "Alley." Any street intended primarily to give access to the rear of property.
3. "Curb." The lateral boundary of a street, whether marked by curbstone or not.
4. "Footway." That part of a public highway intended for pedestrians.
5. "Main Thoroughfare." Any street or part of a street upon which street cars are operated, and also any street or part of a street so signed.
6. "Street Crossing." That portion of a street between the inner and outer boundaries of a footway, projected.
7. "Street Intersection." That portion of a street within the boundaries of the four street crossings.
8. "Alley Crossing." That portion of the alley within the inner and outer boundaries of the footway, projected.
9. "Despatched." Under direction by traffic officer.
10. "Delivery District." The area of traffic congestion officially designed as such.
11. "Safety Zone." That area or space set aside in the street for the use of pedestrians.
12. "One Way." Any street in which vehicular traffic is restricted to one direction.
13. "Vehicle." Everything on wheels or runners, except street cars, horses hitched to a vehicle, horses.
14. "Horse." Any domestic animal.

15. "Driver." The rider, driver or leader of horses, and the operator of a vehicle.
16. "Parked." Any vehicle left in the street without its driver.
17. "Sign." Describes only those officially set by the city.
18. "Right of Way." Privilege of immediate use of street.
19. "Street Car." Any car operated on rails or tracks in the street.

Section 2—VEHICLES

The owner, driver, operator, or person in charge of any vehicle in the City of.....shall conform to and observe the following rules of the road upon all streets, alleys, avenues and public places in said City:

Speed Regulation; Presumption of Negligence

1. Every driver shall keep his vehicle under such control as will enable him by the exercise of ordinary care and diligence to avoid collision or other interference with other vehicles or pedestrians who are proceeding in accordance with traffic regulations.

2. In event of accident presumption of negligence shall rest as follows:

A. As between two vehicles, unless both are proceeding



Mr. Arthur Gaboury, Superintendent Montreal Tramways, Ex-President Canadian Electric Railway Association

in accordance with traffic regulations, upon the one violating the traffic regulations.

B. As between two vehicles, one of which is despatched and the other not despatched, upon the undespatched vehicle.

C. As between a despatched vehicle, and a pedestrian, upon the pedestrian.

Stops

3. No vehicle shall stop within a street intersection, except to avoid collision with a pedestrian, other vehicle or street car.

4. No vehicle shall cross a footway at any point other

than a street or alley crossing without coming to a full stop before crossing.

5. No vehicle shall be stopped in the space between a safety zone and a curb.

6. Fast-moving vehicles in one-way streets shall draw up to the left-hand curb before stopping.

7. With the exception of the above case, and of cases where vehicles are permitted to park in the street bed, all vehicles shall draw up to the right-hand curb before stopping, unless such stop be necessary to avoid collision with a pedestrian, other vehicle, or street car.

8. Every driver of a vehicle shall give a clear signal by wave of hand or mechanical device, visible to traffic in rear, before he shall slow down, stop, back or turn.

9. Any projection beyond the standard width of a vehicle, and any projection extending more than five feet in front of or behind any vehicle, shall carry a red flag from one hour before sunrise to one hour after sunset and a red light at other times.

10. Every vehicle shall be equipped with a horn, bell or adequate signal device.

11. Such horn, bell or device, shall be operated only when necessary to avoid accident, or to signify a desire to pass a vehicle immediately in front.

12. No vehicle shall be equipped with a horn, bell or signalling device of the type herein provided for emergency service, or of such type as to be easily mistaken for the signal for such emergency service.

13. All motor vehicles, except motorcycles, with or without side cars, shall be equipped with two headlights of sufficient intensity to be visible for a distance of feet and a red rear light of sufficient intensity to be visible for a distance of feet.

14. Motorcycles, with or without side cars, shall be equipped with one headlight (mounted on the left-hand side of the vehicle, when a side car is attached), and with one rear light, each of the same intensity as is required for other motor vehicles.

15. Horse-drawn vehicles must be equipped with a light or lights showing a white light from the front and a red light from the rear, both visible for a distance of feet; and said light or lights shall be on the left-hand side of said vehicle.

16. Every vehicle under tow shall be equipped with a standard red light in the rear, and with one white light on the left side, visible from the front.

17. Every vehicle operating during the period from one hour after sunset to one hour before sunrise must keep the lights above described lighted during such operation.

18. Every vehicle equipped with a lighting device of more than four candle power shall be equipped also with, and shall constantly use, an approved lens of screening device.

19. Vehicles standing in the street and not in motion are required to show during the hours in which lamps must be lighted, either the above lights or a single light, on the left-hand side of such vehicle, showing white from the front and red from the rear, visible in each direction for a distance of, at least, feet.

Passing Rules

20. Vehicle shall not pass a street car when the latter is stopped or stopping to receive or discharge passengers, unless such street car is at a safety zone.

21. Except on one-way streets, vehicles desiring to pass a street car shall do so on the right-hand side, but shall pass any other vehicle on left-hand curb.

22. On signal of a desire to pass from a vehicle in the rear, any vehicle shall immediately draw over as close as practicable to the right-hand curb.

23. No vehicle shall pass another vehicle unless there is full clearance to pass without interfering with traffic moving in the opposite direction, and the passing vehicle shall not draw back into line until after it has fully cleared the vehicle or vehicles passed.

24. Except on one-way streets, every vehicle shall keep to the right of the center line; slower moving nearer right-hand curb and faster moving nearer center line.

The same to apply at curves or at top of grades.

25. The police authorities shall have full power to establish safety zones within the streets.

26. Such safety zones shall be so indicated as to be clearly visible at all times.

27. No vehicle shall be driven through or over a safety zone.

28. Where a safety zone abuts upon a street car track, all vehicles shall pass between said safety zone and the right-hand curb.

Trailers

29. Vehicles shall not tow more than two trailers and the total length of the string shall not exceed feet.

Right of Way

30. The following vehicles shall have the right of way, when engaged upon official duty, hereafter designated as emergency service:

- A. Vehicles of the fire department;
- B. Vehicles of the police department;
- C. Ambulances of municipal hospitals and other ambulances on approval of the police department;
- D. Emergency and repair wagons of public service companies;

Others as follows:

- E. Street cars;
- F. Other vehicles;
- G. Pedestrians.

31. In addition to the regular bell or gong, all emergency vehicles shall be equipped with an emergency signal of a distinctive type selected and approved by the police authorities. Such signal shall be used only upon emergency service.

32. On the sound of the emergency signal, all street cars shall stop without blocking street, and all other vehicles shall pull over to the right-hand curb, come to a full stop, and give free and unobstructed passage to the emergency vehicle.

33. A despatched vehicle or street car shall have the right of way.

34. Subject to the right of way of emergency vehicles, and to the right of way of a despatched vehicle, street cars shall have the right of way.

35. Traffic on "main thoroughfares" shall have the right of way over traffic on other streets, except as above provided.

36. A vehicle joining the flow of traffic from a standing position at the curb shall yield the right of way to all other vehicles and wait an opening in the line.

37. A vehicle entering the street from an alley or from a building or private property shall yield the right of way to all other vehicles and await an opening in the line.

38. The driver of a vehicle approaching a "main thoroughfare" shall slow down, and enter or cross such thoroughfare at a rate of speed which will permit him to stop his vehicle within its own length.

39. At a point, where two streets intersect, every vehicle, with the above exceptions, shall have the right of way over a vehicle approaching on its left and shall yield the right of way to the vehicle approaching on its right.

Section 3—PEDESTRIANS

1. 1—Pedestrians shall not walk in the street except at street crossings.
2. Children shall not play in streets except at times and within areas designated by authorities.
3. At despatched intersections pedestrians shall move in accordance with the directions of the despatching officer.
4. Pedestrians waiting for street cars shall stand on the sidewalk, except where safety zones are established, until street car is within 200 feet or less from the stop; and after alighting from the street cars pedestrians shall not stand in the street but shall proceed immediately to the right-hand curb.
5. No person shall step onto or off any street car, or catch, or hold on to any part of such street car from the street while said car is in motion.

Section 4—MISCELLANEOUS

1. A vehicle running behind another vehicle shall preserve a sufficient interval to enable the following vehicle to stop without accident in event of an emergency stop on the part of the leading vehicle.
2. All vehicles of lbs. or more, including bicycles, shall be equipped with an effective brake, which shall be maintained at all times in good operating condition.
3. No building or large or heavy object whose movement may obstruct traffic shall be moved along or across street railway tracks, except under special permit of authority.

SECTION 5—PROTECTION OF PRIVATE RIGHTS, OR INTERFERENCE WITH PUBLIC COMFORT

1. Every vehicle operating with an internal combustion engine shall be equipped with a muffler or other effective silencing device which shall not be "cut out" or otherwise eliminated while such vehicle or the motor thereof is running.
2. The driver of a vehicle shall not intentionally cause the motor thereof to backfire.
3. When a vehicle is loaded with iron or other noisy material that may strike or rub together, such load must be properly deadened to prevent unnecessary noise.
4. No motor vehicle shall be permitted to emit a dense smoke.
5. The driver of any vehicle which is standing in front of a private entrance or loading point, or in front of the entrance to a public building, shall upon the request of the driver of any other vehicle desiring to reach said entrance or loading point immediately discharge or take on his cargo and yield his position.

SECTION 6—TRAFFIC SEGREGATION

1. The authorities shall have the power to designate, wherever traffic congestion shall in their judgment warrant such designation, certain special areas which shall collectively be known as the "delivery district."
2. The shall have the power to set apart certain streets and alleys, either for the whole of their length or for a part thereof as one-way streets, and to require all traffic upon said streets or alleys to move in the designated direction.
3. The time from 6 to 9 a.m. shall be designated as the "morning traffic peak"; and the time from 4.30 to 6.30 p.m. shall be designated as the "evening traffic peak." These traffic peaks will be referred to hereafter as "peaks" or as "morning peaks" and "evening peaks" respectively.
4. All horse-drawn vehicles and trucks of the capacity of two tons or over shall be deemed to be slow-moving vehicles.
5. Lower capacity trucks, public buses, shall be deemed to be medium-moving vehicles.

6. Private motor cars, taxicabs, and other vehicles having a speed capacity of thirty miles per hour or over shall be deemed fast-moving vehicles.

7. The Police Authorities shall have the power to designate an area adjacent to any school or similar institution as a "school area" within which at hours fixed all drivers shall exercise the highest degree of care.

8. The Police Authorities shall have the power to designate an area adjacent to any hospital or similar institution as a "hospital" or "quiet zone" within which all unnecessary noises are prohibited.

SECTION 7—GENERAL REGULATIONS

1. All vehicles shall keep to the right-hand side of the center line of the street, except on one way streets or when passing as hereinbefore provided.
2. Any vehicle making a turn to the right shall keep close to the right-hand curb.
3. Vehicles turning to the left shall pass to the right of the center of the street intersection.
4. Vehicles turning back upon their course shall make such turn to the left and shall avoid backing in order to make such turn.
5. Deliveries from vehicles shall be made in such a way as not to block traffic, and in no case shall a delivery wagon be backed up to the curb in such a position as to prevent the passage of a street car.
6. No vehicle repairs, including change of tires, except emergency repairs, shall be made on a main thoroughfare, but vehicles must move to nearest side street.
7. The preceding section shall not be so interpreted as to permit the habitual changing of tires in the street abutting upon the place of business of a dealer in tires.
8. The driver of any motor vehicle shall constantly carry, while operating such vehicle, the proper operator's license issued by the authorities at the place of his legal residence.

SECTION 8—PARADES

1. Any group of pedestrians marching or walking in the street and numbering twenty or more, except the Military, and any group of vehicles numbering or more and proceeding under a common leadership, except funeral processions, shall be deemed a parade.
2. No parade shall pass through any street in the delivery district, excepting under a permit.
3. No parade shall be held during the peak hours.
4. No parade shall block any street car line for a period longer than five minutes.
5. No parade shall be held without first obtaining permit from Police Authorities, who shall designate or approve of the hour or route of parade.

SECTION 9—PARKING

1. No vehicle shall be parked with engine running.
2. Every parked motor vehicle shall be securely locked, but not in such a manner as to prevent emergency movement of same.
3. Every parked horse-drawn vehicle shall be so secured that the horse cannot move faster than a walk.
4. No vehicle shall be parked within twenty-five feet of any fire plug.
5. No vehicle except one owned or controlled by the owner of private property shall be parked in front of the entrance to such private property.
6. No vehicle shall be parked within 75 feet of a street intersection.
7. No vehicle shall be parked between a safety zone and the curb.
8. No vehicle shall be parked in any street unless after

such parking there shall remain sufficient space for two lines of moving vehicles.

9. No vehicle shall be parked in the delivery district, except in designated areas, and at times designated.

10. The police department shall have the authority, whenever in their judgment it may be necessary in order to avoid interference with traffic, to forbid parking in certain designated areas.

11. No vehicle shall be parked within fifty feet of the entrance to any public building or place of assembly.

SECTION 10—SPECIAL REGULATIONS FOR ONE-WAY STREETS

1. Slow-moving vehicles shall keep to the right.

2. Medium-moving vehicles shall keep to the center.

3. Fast-moving vehicles shall keep to the left.

4. Medium and fast-moving vehicles shall pass each other and slow-moving vehicles to the left.

5. Slow-moving vehicles shall pass each other to the left and may pass medium and fast-moving vehicles to the right.

SECTION 11—SPECIAL REGULATIONS FOR THE DELIVERY DISTRICT

1. No vehicle shall back a distance of over feet.

2. Vehicles shall not stop for delivery or loading of goods during peak hours.

3. Vehicles stopping for the delivery or loading of goods shall stand with the right-hand side to the curb, unless allowed to make end or angle delivery by permit.

4. Special permits for end or angle delivery or loading may be issued by the police department for any one time, except during the peak hours.

5. Continuous permits for end or angle delivery or loading, valid until revoked, may be issued only for the period running from the end of the evening peak to the beginning of the morning peak. Such permits may be revoked by the police department, if they prove to be an undue interference with traffic.

6. Vehicles having a width in excess of feet, or length in excess of feet, shall not be permitted to operate in the delivery district, excepting by special permit.

7. Display vehicles operated chiefly for advertising purposes, and slow-moving vehicles, shall not be operated in the delivery district during the peak hours.

8. Vehicles shall make no left-hand turns in the delivery district during peak hours.

9. Vehicles desiring to turn to the right in the delivery district during peak hours shall pull over to the right-hand curb before reaching the corner at which they expect to turn.

10. On signal from a driver that he desires to pull over to the right-hand curb, vehicles between him and the curb line shall slow down and allow him to enter the slow-moving stream at the right-hand curb.

11. The police department shall have power to make, from time to time, such additional regulations as public interest may require, but such regulations are to remain in force only until the shall act in the premises.

SECTION 12—STREET CARS

1. All street cars shall be kept in such condition of repair that no excessive, unnecessary and avoidable noise shall be caused when such street cars are in operation.

2. Every street car shall be equipped with an effective brake or brakes which shall at all times be maintained in good operating condition.

3. Every street car equipped with motors shall be equipped with life guard, fender, or other device approved by designed to most effectively protect life and limb.

4. All street cars shall make, in addition to fixed stops for passengers, such other stops as may be designated by the

5. Every street car shall be properly lighted one hour after sunset to one hour after sunrise.

Violations of any of the provisions of this ordinance shall be a misdemeanor and punishable, upon conviction by the Recorder's Court, of a fine of not less than Five Dollars or eight days and no more than Fifty Dollars or two months.

PARKING DISTRICT

Description of Parking District and other streets, where parking is permitted and time of same, to be given here.

Tenders for Railway Electrification in S. Africa

A cablegram from American Trade Commissioner Stevenson, of Johannesburg, South Africa, under date of February 17, states that tenders are being invited covering the electrification of the railway from Cape Town to Simonstown, and also the section of the Natal main line from Durban to Pietermaritzburg. The electrification project includes substations, boiler-house equipment, and condensing plant, together with electric locomotives for freight, passenger, and shunting services. Specifications for these are obtainable from the South African High Commissioner, 32 Victoria Street, London, at £5 5s. for the first copy and £2s. for each additional copy. Bids for these projects are to close May 3.

In the Board of Trade Journal (London), under date of August 26, 1920, it is noted that the Cape Town-Simonstown line is a suburban railway with a heavy passenger service, while the Durban-Pietermaritzburg section deals with heavy freight traffic and a main-line passenger service. The suburban line, according to the scheme, is to be worked on the multiple-unit system, while on the mainland large electric locomotives are to be used. The estimated expenditure based on present-day prices for the Cape Town-Simonstown line is £1,464,000 and that of the Durban-Pietermaritzburg line £2,921,400.—Commerce Reports.

Bad Fire Cripples Levis County System

The Levis County Railway Company suffered a disastrous fire on Monday, February 21, which destroyed nearly all the rolling stock, the snow fighting equipment and the car barns. Mr. H. E. Weyman, the manager of the company, writes as follows:

About 5.35 a.m. on Monday, February 21st, the fire started at the back of the car barns, in or around an old double truck car, which car had not been in service since Saturday night. Alarm was given to the fire station immediately and the company's employees, of whom three were on duty, coupled up the hose pipes to the hydrants inside the car barns to endeavor to put the blaze out. Owing to the low water pressure they were unable to do anything and within ten minutes the whole barns and shops were on fire. All the company's equipment was destroyed, together with the shops and stores, except four new Birney safety cars and two constructed one-man truck cars, which were out in operation. The equipment destroyed was as follows: Five double truck cars; 8 Birney safety cars, 3 constructed one-man cars, 2 rotary plows, 4 sweepers.

The company is, therefore, left without any snow equipment to continue operations, and with only six cars. Everything was covered by insurance at the purchase value, but not replacement value.

Contract will be let for electrical work on \$10,000 creamery being built at Telkwa, B.C., by the Edmonton City Dairy Co.

B.C.E.R. Co. Take Firm Stand in Dealing with Employees—Strike Settled by Arrangement

In an effort to force the British Columbia Electric Railway Company to accept the finding of the Conciliation Board which recently investigated claims of the men for higher wages and better working conditions, members of the Electrical Workers' Union in the employ of the B.C.E.R. declared a strike on February 22. This case is said to be the first in many years where the employing body has been the one to refuse to accept the award of a Board of Conciliation. The award in question, while it did not grant an increase in wages, considered the present time to be inopportune for a reduction, while the company stand by their former declaration that the wages they are paying are higher than those paid by similar organizations elsewhere and are the result of an agreement which was forced upon the company by the men during the war, and that, as the cost of living has been reduced, they are compelled to reject the award and cut wages.

When the company made known its intentions, the men took a strike vote and communicated with International headquarters in Washington from whence they received authority to strike. In Vancouver there are 125 and in Victoria 65 men affected. The action to be taken by the other employees such as conductors and motormen has not yet been decided upon. A meeting was held at which they decided to hold a mass meeting during the week to decide the attitude of the street railwaymen regarding a sympathetic strike.

Mr. W. G. Murrin, assistant general manager of the B. C. Electric Railway Company, made the following statement with regard to the strike:

"I was quoted in the local press as having said that the award of the board of conciliation was unfair. This statement is quite misleading and I wish to say emphatically that I consider the award was very carefully prepared and quite fair on the evidence which was given at the time.

"It must be remembered that sittings of the board took place in November and December, and the negotiations in connection with the agreement commenced in August last. It was in that month that we made the offer to the men on which the award of the board was based. Since then the cost of living and the wages paid in other lines of industry have been decreasing steadily and this tendency is very much in evidence at the present time. The effect of the long-drawn-out negotiations has been that the men have been receiving the wages at the higher rates, so that all the benefits of an agreement as if signed in August have already come to them. If such an agreement had been signed, we would have been perfectly justified in reopening it at the present time and putting into force the reductions we are now suggesting.

"The company is not trying to bring about a general reduction in wages to its employees but is endeavoring merely to adjust some of the inequalities and anomalies in the wages of certain classes of its electrical workers, who are now receiving more than men doing similar work in other departments of the company.

"The wages we are now offering are higher than are being paid in the city for corresponding work. The linemen's and wiremen's rate of \$7 a day compares with the rate of \$6.27 a day paid to skilled mechanics, including electrical workers, machinists, boilermakers, blacksmiths, plumbers and pipefitters, acetylene welders, sheet metal workers and such like, employed in the shipbuilding and engineering works of Vancouver and district.

"The rate of \$4.95 a day for groundmen or linemen's

helpers compares with \$4.47 a day paid to the mechanics' helpers in the shipyards and engineering plants at present. The automobile drivers are offered \$4.95 a day plus one hour extra each day when they assist the gang in addition to driving the truck. This makes their rate \$5.57 a day, as compared with rates paid to truck drivers throughout the city of \$4.50 to \$5.

Compares Scales

"The substation operators are offered rates varying from \$150 to \$190 a month as compared with Winnipeg, \$125 to \$145; Calgary, \$139 to \$154; Ottawa, \$135 to \$150; Edmonton \$150 to \$155. Other wages provided for by the new schedule are floormen and oilers in substations (unskilled work) \$130 a month; meter department men, \$144 a month; trimmers of arc lamps, \$140 a month. These men have regular work, year in and year out and the wages they are paid taken into conjunction with the amount of skill required to do the work are considerably higher than wages paid for corresponding work within the city.

"In addition to these wages, all these employees have a free street car pass and get cheap rates for electric light and gas and other concessions. The company estimates these concessions to be worth 40 cents a day or \$10 a month."

The latest report is that the strike has been settled by adjustment.

Is Electrical Engineer W.E.R. Co.

Mr. D. K. Lewis was recently appointed electrical engineer for the Winnipeg Electric Railway Company. Mr. Lewis was born in South Carolina and received his education at Clemson College, South Carolina, where he graduated in 1903. His start in the electrical world was in June of that year, when he entered the service of the General Electric Company at Schenectady, N.Y., in their Testing Department.



Mr. D. K. Lewis

In 1905 he was transferred to the Construction Department of the General Electric's Chicago office, where he remained for twelve years. In April, 1917, he enlisted in the United States army, and received his discharge in December, 1918. Mr. Lewis was then appointed electrical engineer for the Fort Dodge, Des Moines and Southern Railroad, where he remained to November, 1920, leaving this company to take the position that he is now holding, namely, electrical engineer for the Winnipeg Electric Railway Company, Winnipeg, Man.

Current News and Notes

Apple Hill, Ont.

J. S. Livingstone, general contractor of Maxville, Ont., has commenced work on the power line at Apple Hill, Ont., for the village council. It is estimated the cost will run from \$3,000 to \$5,000.

Barrie, Ont.

The County Council have instructed the Building Committee to secure estimates on the cost of electric wiring and fixtures for the Court House at Barrie, Ont.

Brantford, Ont.

Plans are being prepared for an addition to the Hydro Plant at Brantford, Ontario, estimated to cost \$15,000. Tenders will be received by architects from March 1st and close March 14th.

Chatham, Ont.

A large deputation from the Kent County Council recently waited on Premier Drury, urging that the Chatham, Wallaceburg & Lake Erie Railway, now owned and operated by the McKenzie & Mann interests, be taken over by the Ontario Hydro Electric Power Commission.

District of Algoma.

A newly formed company, known as The Iron Bridge Telephone Company, Ltd., has been authorized to own, control and operate a telephone system in the townships of Gladstone, Patton, Parkinson and Bright townships, in the District of Algoma.

Fordwich, Ont.

The ratepayers of Fordwich, Ont., recently voted for the issue of a \$12,000 hydro-electric debentures. The cost of power will be \$93 per h.p., according to reports.

East Toronto, Ont.

Messrs. Briggs & Nichol, 1566 Danforth Ave., Toronto, have been awarded the contract for electrical work on a store and apartment building which will be built on Main Street, East Toronto.

Gorrie, Ont.

The village of Gorrie, Ont., recently carried a by-law for the issue of a \$12,000 hydro-electric debentures. The cost of power will be \$69.00 per h.p.

Guelph, Ont.

The Public Works Dept., Provincial Government, are contemplating the installation of electric power, light and telephone lines at the Ontario Agricultural College, Guelph, at an estimated cost of \$10,000.

The operation and management of the Guelph Street Railway, Guelph, Ont., will be turned over to the Ontario Hydro-Electric Power Commission to take effect May 1st, 1921. In the meantime, a seven cent fare has been approved by the Private Bills Committee of the Local Legislature. The fare was formerly five cents.

Hamilton, Ont.

The Dominion Power & Transmission Company, Hamilton, Ont., are requesting permission of the City Council to increase the street car fares.

High River, Alta.

The citizens of High River are voting on March 21st on a by-law to install an auxiliary plant at a cost of \$10,000. The Canadian Air Board has recently been transferred to this town from Morley, and a new municipal hospital is being built this summer, which makes it important that a twenty-four hour service be available. Murray Bros. are drilling a

gas well 100 feet north of the power house and, if successful in striking a flow of gas, this will be used under the boilers of the power house as well as for distribution over the town.

Kenora, Ont.

According to latest reports work will commence almost immediately on the extension of the Kenora municipal plant. The present building is to be enlarged to permit of the installation of new power units sufficient to bring the total amount generated up to approximately 8,000 h.p. These extensions are in connection with a pulp and paper mill to be operated by E. W. Backus, Fort Frances.

London, Ont.

Kenneth J. Dunstan, vice-president of the Bell Telephone Company, in addressing the Rotary Club at their noon luncheon recently, stated that his company will this year spend \$150,000 in extensions and improvements in the exchange at London, Ont.

Montreal, Que.

The Sawyer Electric Co., 87 Bleury St., Montreal, Que., have been awarded the contract for electrical work on an office building at 1502 St. Catherine St., E., Montreal, undergoing alterations at an estimated cost of \$110,000.

Vallee & Hamelin, 1867 St. James St., Montreal, Que., have been awarded the contract for electrical work on St. Georges School, recently erected at the corner of Baldmere & Tellier Sts., Montreal, at a cost of \$60,000.

W. Roy, 595 Centre St., Montreal, Que., has been awarded the contract for electrical work on two residences that have recently been erected at Belgrave Ave., Sherbrooke and C.P.R. tracks, Montreal.

H. R. Cassidy, 255 Regent Ave., Montreal, Que., has been awarded the contract for electrical work on a warehouse that is being erected on Duke St., Montreal, at an estimated cost of \$60,000.

The Marchand Electric Company, Ltd., 55 Cote St., has been awarded the contract for electrical work on a building on Le Roy St., owned by the Salada Tea Company, Ltd., which is being altered into a warehouse at an estimated cost of \$150,000.

Messrs. Marchand Electric Company, Ltd., 55 Cote St., Montreal, have been awarded the contract for electrical work on a store and office building being built at the corner of Labelle & St. Catherine St., East Montreal.

Mr. G. W. Hilton, formerly connected with the Northern Electric Co., Ltd., Montreal, as lighting and appliance specialist, became a partner in The Acme Vacuum Cleaner Co., Ltd., at the beginning of the present year. M. Hilton was also at one time assistant manager for the Robert Mitchell Company, Montreal.

Mr. H. E. Sayer and Mr. W. J. Burt, of the Sayer Electric Company, Montreal, recently attended the convention of the Lighting Fixture Dealers, and the Annual Lighting Fixture Market held in Buffalo, N.Y.

Ottawa, Ont.

The annual financial report of the Ottawa Light, Heat and Power Company, Ltd., show net earnings at about the same level as a year ago at \$228,700, compared with \$230,971. After all charges, surplus is \$18,700, against \$9,459 in 1919.

Port Arthur, Ont.

The cities of Port Arthur and Fort William, Ont., have appealed to Hon. Harry Mills, Minister of Mines, to sponsor

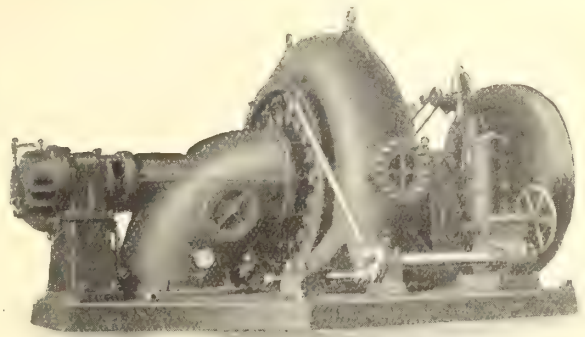
Can You Afford?

to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine? Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.



BE FIRST

Canadian Hykon Company
55 John St. South - Hamilton, Ont.



Accompanying illustration shows one of three single horizontal shaft, "Francis" type

SMITH HYDRAULIC TURBINES

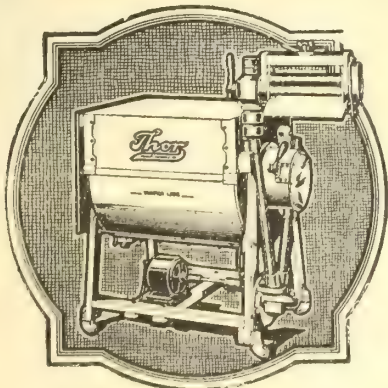
Recently installed in Spain; each developing 3200 Horse Power, at 500 R.P.M. under 328 ft. head. To sustain the hydraulic thrust of the runner, each unit is equipped with a Gibbs Thrust Bearing.

If interested, write for Bulletin "N."

S. Morgan Smith Co. York, Pa.

H. B. Van Every, Rep., 405 Power Bldg., Montreal

Fourteen Years the Leader



Thor

Electric Washer

The Thor Electric Washer has won the stamp of world leadership by fourteen years of faithful service. It is the standard by which all others are judged. 500,000 women are using Thors.

This dominant position occupied by Thor Electric Washers is one of the most valuable assets a Thor dealer has. It is a selling force which means dollars for every Thor dealer.

If you want to build your sales, move your stock and create good will, sell the Thor.

HURLEY MACHINE COMPANY, LTD.
413 YONGE ST. - TORONTO, CANADA

a bill empowering the cities to charge a seven-cent fare on the street railway.

Regina, Sask.

The Regina Municipal Railway recently made a test run of the first one-man car on its lines. City officials and passengers were carried on this run and it is reported the trial trip was a success.

A new company known as the K. W. Electric, Ltd., with its head office at Regina, Sask., has been incorporated with a capital of \$25,000.

The Regina Municipal Railway System are trying out the one-man safety type of car on their lines. The municipality had always voted against this type of car until the last New Year election, the chief objection being raised by labor.

Sarnia, Ont.

The Smith Electric Co., Sarnia, Ont., has been awarded the contract for the electrical work on two residences being erected on the corner of Christina & Exmouth Sts.

The Smith Electric Co., Front St., Sarnia, have been awarded the contract for electrical work on an apartment house that will be erected at Cromwell & Brock Sts., Sarnia, at a cost of \$50,000.

St. Catharines, Ont.

The Clifford Electric Co., 21 Ontario St., St. Catharines, Ont., have been awarded the contract for electrical work on a residence recently built at 35 Catharines St., St. Catharines.

Prices are wanted for electrical wiring and fixtures by Jos. Levine, 64 North St., also by Mr. H. Smith, 73 Taylor Avenue.

The Clifford Electric Co., 21 Ontario St., St. Catharines, Ont., have been awarded the contract for electrical work on a residence recently erected on Adam Street for A. E. Jencks, at a cost of \$14,000.

St. Johns, Que.

Contract has been awarded to P. Trahan, St. Jean Street, for a \$50,000 blank book plant, and he is desirous of obtaining prices on electrical wiring and fixtures.

Summerside, P.E.I.

The town of Summerside, P.E.I., recently bought out the plant of the Sun Electric Company at a valuation of somewhere between \$30,000 and \$35,000. The plant consists of a 125 h.p. steam engine, and a 150 h.p. producer gas engine, to which are belted two 150 k.w. 125 cycle, 1040 volt generators.

Thessalon, Ont.

The annual meeting of the Sudbury Hydro-Electric Development Company was recently held at Thessalon, Ont., and directors appointed. It is understood to be the intention of the directorate to proceed with the development work on their plant at Milltown, Ont., shortly.

Thorold, Ont.

An action for damages by electrolysis pending between the town of Thorold and the Niagara, St. Catharines & Toronto Railway Co., has been settled out of court, the railway company agreeing to pay the town \$3,000 damages and to rebond its rails.

Timmins, Ont.

It is reported that the Hollinger Consolidated Mines Company is taking action against the Northern Canada Power Company in an endeavor to secure damages arising as a result of the power company's failure to supply power requirements. The case will be dealt with in the Supreme Court.

Toronto, Ont.

Two overflowing meetings of the Electric Club of Toronto, held February 25 and March 4, were addressed by

Mr. W. E. Cowan and Major Paul H. Lazenby. Mr. Cowan, who is distribution manager of the Packard Ontario Motor Car Company, spoke on "Salesmanship." Major Lazenby's topic was "Commercial Development and its Relationship to Transportation."

Mr. R. H. Hughes, 466 Yonge St., Toronto, has been awarded the contract for electrical work on residence being erected at 103 Roseheath Ave., Toronto.

The Canada Gazette announces the incorporation of the Electric Phonograph Company of Canada, Ltd., with head office at Toronto, for the purpose of acquiring the Canadian rights of the Automatic Products Company of Cleveland, Ohio, and such other lines as may appeal to them. The company is capitalized at \$250,000.

R. Balment, 71 Westlake Ave., Toronto, has been awarded the contract for electrical work on a store and apartment building being erected at the corner of Morley & Applegrove Aves., Toronto, at a cost of \$12,000.

Smith & Hawk, 254 Cedarvale Ave., Toronto, have been awarded the contract for electrical work on two residences at 89-91 Newmarket Ave., Toronto, that are being erected at a cost of \$5,500 each.

Porter & Co., 2 Toronto St., Toronto, Ont., have been awarded the contract for electrical work on an infirmary building now in course of construction at the corner of Davenport Road and Ossington Ave., Toronto, Ont., for the Ontario Odd Fellows Home Board.

Mr. R. N. Mitchell, 140 Leslie St., Toronto, has been awarded the contract for electrical work on a store and apartment building erected recently on Gerrard St., E., near Woodbine, Toronto, at an estimated cost of \$12,000.

Charles A. Branston & Co., dealers in electrical appliances, 355 Yonge Street, had a fire in their store recently that did damage to the amount of \$1,000.

Messrs. Taylor Bros., 25½ Norwood Ave., have been awarded the contract for electrical work on two residences that are being erected on Cedarvale Ave., Toronto, at an estimated cost of \$16,000; also for another residence being erected on Cedarvale Ave., near Danforth, at an estimated cost of \$10,000.

Victoria, B.C.

The Murphy Electric Co., 602 Sayward Bldg., Victoria, B.C., has been awarded the contract for electrical work on residences recently erected at 1212 Seaview Ave., and 2109 Vancouver St., Victoria.

The Carter Electric Co., 615 View St., Victoria, B.C., has been awarded the contract for electrical work on a building at 911 Government St., Victoria, B.C., which is being remodelled at an estimated cost of \$15,000.

Windsor, Ont.

The Crown Electric Company, Windsor, Ont., have been awarded the contract for electrical work on a building that is undergoing alterations at 13 Pitt St., West, Windsor.

Winnipeg, Man.

On March 1st, the Star Electric Co. Limited, electrical contractors, removed to larger and better premises, located at 185 Lombard Avenue, Winnipeg.

Recommendation has been made to the legislature by J. M. Leamy, power commissioner, that an organization be formed to be known as the Manitoba Municipal Power Union, composed of municipalities using power from the provincial hydro-electric system. The aim of the association would be to promote harmony between the commission and municipalities.

The Star Electric Co., 191 Portage Ave., Winnipeg, Man., has been awarded the contract for electrical work on a bank building at the corner of Main St. and Portage Ave., which is being altered at an estimated cost of \$10,000.

We have available for immediate shipment approximately 250 motors, mostly 3 phase, 25 cycle, 220 and 550 volt.

The following are a few of the bargains. We have many others equally attractive:—

Single Phase, 25 Cycle, 110 Volt.

4	1/8 H.P. Menominee, 1400 RPM., new, each	\$ 32.50
2	1/4 H.P. St. Louis, 1400 RPM., new, each	40.00

3 Phase, 25 Cycle, 220 Volt.

6	2 H.P. Crocker-Wheeler, 1500 RPM., new, each	170.00
4	3 H.P. Crocker-Wheeler, 1450 RPM., new, each	200.00
3	5 H.P. Crocker-Wheeler, 1450 RPM., new, each	235.00
2	5 H.P. Robbins-Meyers, 1450 RPM., used, each	185.00
6	7 1/2 H.P. Crocker-Wheeler, 1450 RPM., new, each	420.00
1	7 1/2 H.P. Westinghouse, 1450 RPM., new, each	420.00
2	15 H.P. Crocker-Wheeler, 725 RPM., new, each	625.00

All above 3 phase motors have base and pulley.
7 1/2 H.P. and up have approved starters.

3 Phase, 25 Cycle, 550 Volt Motors without pulley, base or starter.

43	1 H.P. Westinghouse, 1400 RPM., new, each	135.00
10	10 H.P. Westinghouse, 1400 RPM., new, each	290.00
30	15 H.P. Westinghouse, 1400 RPM., new, each	360.00

3 Phase, 25 Cycle, 550 Volt, with base, pulley and starter.

3	7 1/2 H.P. General Electric, 1500 RPM., used, each	385.00
3	10 H.P. General Electric, 1500 RPM., used, each	415.00
1	15 H.P. General Electric, 750 RPM., used, each	560.00
1	30 H.P. General Electric, 750 RPM., used, each	575.00
2	40 H.P. General Electric, 750 RPM., used, each	925.00
1	50 H.P. Westinghouse, 750 RPM., new, each	975.00
1	75 H.P. General Electric, 750 RPM., used, each	1275.00
1	100 H.P. General Electric, 750 RPM., used, each	1850.00

Miscellaneous Apparatus

1	Wagner Rotary Converter, 25 cycle, 220 volt, suitable for 2 moving picture machines	800.00
1	Motor Generator Battery Charging Set, 110 V., 25 cycle, A.C., 10 A., 30 V., D.C.	225.00

McNaughton-McKay Electric Co.
LIMITED

Telephone 4241

WINDSOR, ONTARIO



— USE —

HART

STORAGE BATTERIES

Made in Canada

The Canadian Hart Accumulator Co., Ltd.

St. Johns, P. Q.

Montreal, P. Q.

VERMONT ELECTRICAL SLATE

FOR SWITCHBOARDS,
PANELBOARDS, LIN-
ERS, ETC., IN PLAIN
AND MARINE BLACK
FINISH.

*Get in touch with
us for prices and
full information.*

HYDEVILLE SLATE WORKS
HYDEVILLE, VERMONT, U. S. A.

SINGLE PHASE, 60 CYCLE, 110 VOLTS

4—1/6 H.P. New Motors	\$35.00
1—1/4 H.P. Elec. Eng. Motor	55.00
1—1/2 H.P. Toronto & Ham. Motor	60.00

THREE PHASE, 60 CYCLE, 220 VOLTS

1—2 H.P. C.G.E. Motor	\$125.00
1—3 H.P. Packard Motor	130.00
1—7 1/2 H.P. Lincoln Motor, new	300.00
1—10 H.P. Globe Motor	275.00
1—15 H.P. C.G.E. Motor	400.00
1—15 H.P. Lincoln Motor	450.00
1—35 H.P. Rewound S.G.E. Motor (without starter)	700.00

THREE PHASE, 25 CYCLE, 220 VOLTS

1—1 H.P. Toronto & Ham. Motor	\$120.00
1—3 H.P. Westinghouse Motor	175.00
1—15 H.P. Westinghouse Motor, new	550.00
1—20 H.P. Westinghouse Motor	650.00

THREE PHASE, 25 CYCLE, 550 VOLTS

5—1 H.P. Westinghouse Motors	
1—2 H.P. C.G.E. Motor	\$125.00
1—3 H.P. 750 RPM. C.G.E. Motor	150.00
6—3 H.P. Westinghouse	
7—5 H.P. Westinghouse	
1—5 H.P. C.G.E. Motor	180.00
4—7 1/2 H.P. Westinghouse	
8—10 H.P. C.G.E. & Westinghouse	
1—20 H.P. Westinghouse, 720 RPM.	625.00
1—25 H.P. C.G.E. Motor	700.00
1—30 H.P. C.G.E. Motor	700.00
2—40 H.P. Westinghouse & Wagner Motors	850.00
6—50 H.P. Westinghouse & Wagner Motors	775.00

Other miscellaneous sizes of 60 cycle and 25 cycle on request.

The Industrial Engineering Company of Canada, Ltd.

Consulting Engineers—Electrical Equipment

25 Royal Bank Bldg.
WINDSOR, ONT.

Carlaw Bldg.
TORONTO, ONT.

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1.
Walter Clinton, Welland, Ont., 22-7

For Sale

450 k.v.a. Hydro Electric Equipment.
One new C.G.E. 450 k.v.a., 400 r.p.m., 6,600-volt water wheel type generator.
One exciter for above.
One new double runner S. Morgan Smith unit. 37 feet head for direct connection to above.
Switchboard complete.
This equipment will be sold in whole or part. The hydraulic equipment is at York, Pa., and the electrical equipment is at Peterboro, Canada.

The Nova Scotia Power Commission,
Halifax, N. S. 5-8

Reliable Manufacturers. Agents in Vancouver are desirous of adding some strong agencies for electrical equipment or specialties to their list. We would like to hear from any manufacturer who is desirous of placing his product in British Columbia. Electrical News, Box 88, 212 Winch Bldg., Vancouver. 3-6

Motors for Sale

Large stock of 25 cycle and 60 cycle Motors, consisting of Westinghouse, Crocker-Wheeler and C. G. E. makes. Motors purchased from American Government and have seen little or no use. Attractive prices.

Apply—L. S. Tarshis & Sons,
400 Front St. East,
Toronto, Ont. 2

For Sale

Sash, door and planing mill machinery, boilers, engines, motors, pulleys, gears, machine shop & moulding machinery, 8 ft. Linderman glue jointer. Full printed list on request to Cargill Limited, Cargill, Ontario. 5-8

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-t.f.

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.50 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

Wanted Position of Responsibility by Competent Electrician. 20 years' practical experience in light, heat and power. Capable of taking full charge. First class credentials. Will go anywhere. Write Box 501, Electrical News, Toronto. 5-6

ELECTRICAL SALESMAN WANTED, one with knowledge of motors, generators, etc., speaking French and English for the Province of Quebec. Apply to Electric Motor & Machinery Co., Ltd., 417 St. James Street, Montreal, Que. 6-7

ELECTRICAL MOTOR SALESMAN wanted for the Province of Ontario. Apply stating experience, etc., to Electric Repair & Contracting Co., Ltd., 413 St. James Street, Montreal, Que. 6-7

Cutting 44 in. Steel Riser with Oxy-Acetylene Flame

A 44 in. (square) steel riser at the plant of the National Car Coupler Co., Attica, Ind., was cut recently with the oxy-acetylene flame. The cut was rendered more difficult because of the upright position of the riser, which necessitated a horizontal cut. If the riser had been horizontal and the cut vertical the operation would have been much simplified. To offset this difficulty the operator resorted to first cutting the corners of the riser so as to reduce the uncut cross section to a smaller square. This operation was repeated until the remaining stem could be easily cut through. The equipment consisted of the Oxweld cutting

blowpipe, lamp, oxygen and acetylene tanks dissolved in a cylinder.

How to Cut Wire Rope

A practicable way of cutting wire rope is described as follows in Leschen's Hercules: First, securely bind the rope on each side of the place to be cut; place the cable over a length of old railroad rail or a piece of steel; then cut by means of a coal cutting chisel with handle and a sledge hammer. If it is necessary to cut ropes frequently it is advisable to secure a special cutter for the purpose.

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710	Wagner
" 1	75	3	25	550	480	Westg.
" 1	60	3	25	550	750	Cr. Wh.
New 2	52	3	25	550	720	Lanc.
Used 1	50	3	60	550	600	C.G.E.
" 1	50	3	60	550	970	Westg.
" 2	50	3	25	550	720	Westg.
New 2	35	3	25	550	720	Westg.
Used 1	30	3	25	550	1500	Tor. & Hm.
" 2	30	3	25	550	720	Westg.
" 1	25	3	60	720	720	Cr. Wh.
" 1	15	3	25	550	1450	Westg.
New 1	15	3	25	550	1400	Lanc.
" 1	15	3	25	550	750	Lincoln
" 6	15	3	25	550	720	Westg.
" 2	10	3	25	550	720	Westg.
Used 1	7 1/2	3	25	220	1500	Tor. & Hm.
" 1	7 1/2	3	25	550	1450	C.G.E.
" 1	7 1/2	3	25	550	700	Lanc.
New 1	7 1/2	3	25	550	725	Westg.
" 1	5	3	25	550	1440	Excelsior
" 1	5	3	25	550	710	Wagner
Used 1	5	3	60	200	1120	Westg.
New 3	3	3	25	550	1500	Lanc.
" 5	3	3	25	550	1400	Westg.
" 4	3	3	25	550	1400	Excelsior
" 2	2	3	25	550	1440	Excelsior
" 2	2	3	25	550	1425	Lanc.
" 2	2	3	25	550	1500	Lanc.
" 2	2	1	25	110	1440	Wagner
" 1	1	1	25	110	1440	Wagner
" 1	1 1/2	1	25	110	1420	Wagner
Used 1	1	3	25	220	1500	Tor. & Hm.
New 1	1	1	25	110	1440	Wagner
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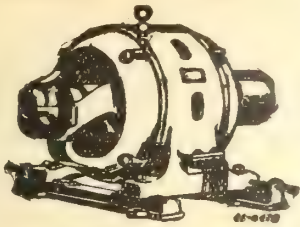
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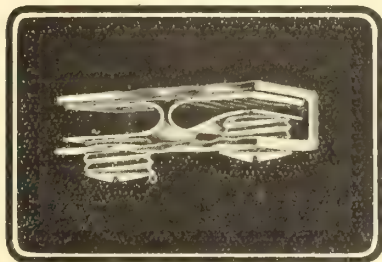
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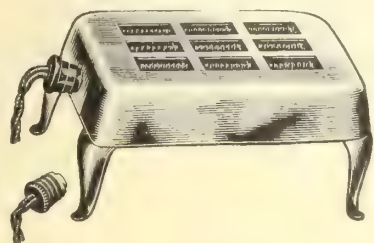
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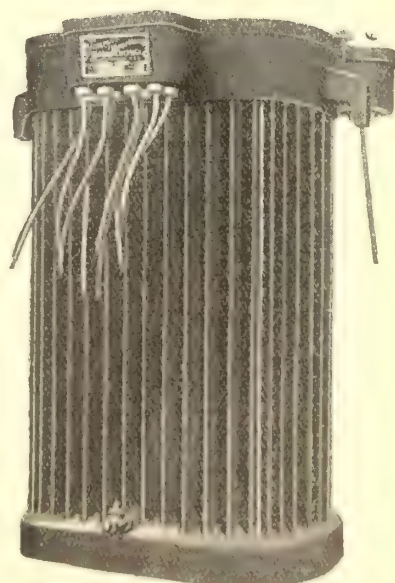
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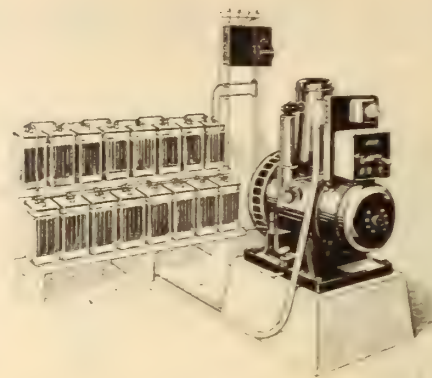
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Rating—one K.W. (1000 watts) with a continuous overload capacity of 20% or more. 32-40 Volts. Direct Current. Battery of 160 Ampere hours. 8 hour rating. Horsepower 2 1/4. 3 S.K.F. Ball Bearings, Detachable cylinder head, Speed (under load) 1,000 r.p.m.

Dominion Steel Products Co., Ltd.

Department K

Brantford, Canada

DOMINION LIGHT

Double the Life of Your Pole Lines

By using our

OPEN TANK TREATED

British Columbia Cedar Poles

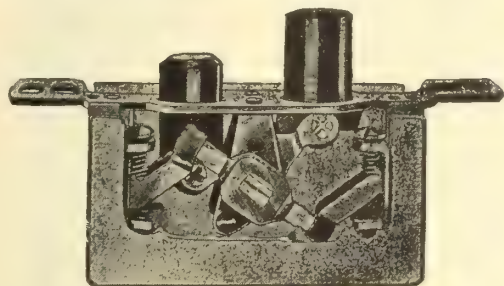
They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices No obligation.

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THE New England Push Switch



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If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

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SLATE

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**ARE THE
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and are
fully guar-
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Independent from
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The Last Word in the Battery Art

A Battery
for Every Car
And Every
Battery
Guaranteed
For 2 Years



Made in Canada

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Your
Enquiry

Manufactured By

THE MINIMAX ELECTRIC & MFG. CO., LTD.

LASALLE 1797

Office and Works:

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Frames and rotors in all sizes from 1 to 125 Horse Power are shipped from Cleveland. They are then wound, impregnated, assembled and tested in our new plant in Toronto. Winding data and specifications are furnished by

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The completed motors turned out by us are up to the Lincoln standard in every way. Lincoln engineers fit the power to the work. We will sell you Performance and Service.

Quick Delivery

can be made of slow speed motors
500 R.P.M. 25 Cycle
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when proper frames are in stock.
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HIGH GRADE BRUSHES

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For ALL TYPES of
Motors and Generators

Made in Canada

All orders shipped promptly

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STORAGE BATTERIES

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Organized 1898

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Underground Electric Systems *is of Homogeneous Construction*

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It's like an extra man around the shop. Made of pressed steel, nickled.

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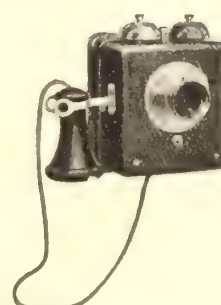
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(Steel Cabinets)



TYPE NO. 39



TYPE NO. 19

We Make All Styles
"A System for Every Service"
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CRUDE OIL ENGINES

CUTOFFS

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DISCONNECTORS

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DOORS FOR BUS AND SWITCH COMPARTMENTS

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ELECTRIC SWITCH BOXES

ELECTRICAL TESTING

ELEVATOR CONTRACTS

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FIBRE (Hard)

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FIRE ALARM EQUIPMENT

FIXTURES

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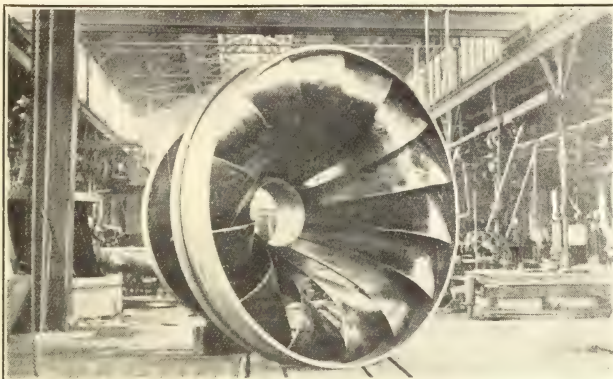
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ONTARIO

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*The
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NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

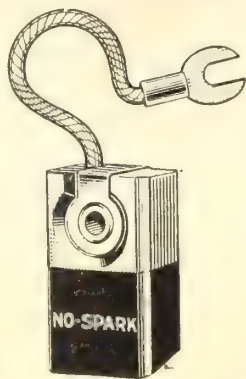
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

Send for our interesting bulletins.

CALEBAUGH Self-Lubricating Carbon Co.

1503 Columbia Ave., PHILADELPHIA, PA.

Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



LAMPS Locked On Can't Get Stolen

They can't get knocked out or broken.



guards give your lamps just such protection.

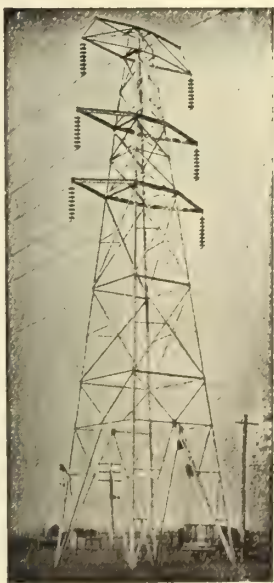
Sold at a popular price. Our Loxon Lamp Guards and other Specialties demand the attention of

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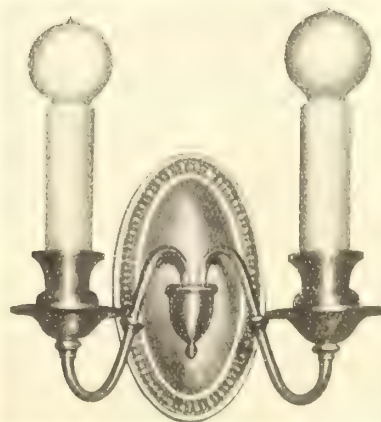
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We shall be pleased to furnish designs and estimates upon request.

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No. 2640

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Owing to its extreme toughness, Conite is adaptable to a wide range of electrical usage and due to its higher and more uniform dielectrical strength, thinner sizes may be used. The economy effected is obvious. Conite comes in sheets and rolls from .005" to .020" thick.



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The strongest, most permanent and waterproof of insulating materials. Bakelite-Dilecto possesses extraordinary dielectric strength and its extreme physical properties permit its use in many mechanical operations. It is made in sheets, rods, tubes and special shapes.

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from Anxiety Use

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INSULATING VARNISHES

In either Air-drying or Baking Qualities

Finish with

"PAKYDERM"

Clear or Black Varnish (Air-dries in 30 Minutes)

Your job will then be proof against breakdowns,
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overheating, undue stresses, greening, vibra-
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Let Your Workman Be the Judge

When you want to find out if a tool is satisfactory, ask the man who uses it. He knows if it's properly balanced—heavy enough to do the work and still not so heavy it will tire the workman. He knows how long it will withstand hard service.

OSH KOSH

CONSTRUCTION TOOLS

are the choice of nine out of ten workmen. That's why more Oshkosh Tools are sold than of all other makes combined.

Ask your jobber.

OSHKOSH MFG. CO.

905 Lectric Street,

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Brand New Pull Chain Socket—Featuring— A Smooth Even Pull at Any Angle

Best
Sliding
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Ever
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Built
For
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And
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No. 5000

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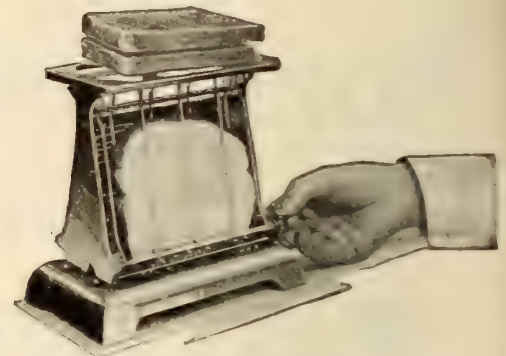
DUNCAN ELECTRICAL CO. Ltd.
MONTREAL, - CANADA

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Westinghouse

Most important of all, Westinghouse Appliances are reliable.

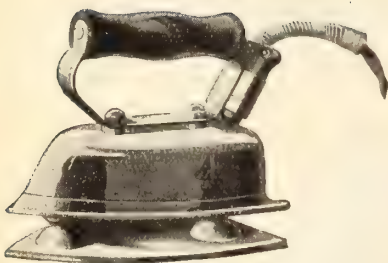
Built both substantially and attractively, they sell readily.



The Turnover Toaster Turns the Toast

The Type H Iron uses little current and uses that little to best advantage—centering it upon the ironing surface.

The Turnover Toaster is not only attractive, but is just as useful and convenient as it is attractive. Turn the knob and the toast is turned.



Type H Iron—The heat is centered on the ironing surface.

All Westinghouse Appliances sell readily, for the Westinghouse reputation for reliability is world wide.

Dependable Repair Work—and no other kind is tolerated by the cautious operator of electrical apparatus—**SERVICE** is the natural result when performed by factory-trained experts, supported by the engineering skill and manufacturing knowledge associated with the name—

Prompt Repair Service has been assured to users of Westinghouse apparatus, by establishing at convenient points repair shops operated by the Company's Service Department, where repair work is executed with all pos-

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WINNIPEG—158 Portage Ave. E.
CALGARY—316 Third Ave. E.

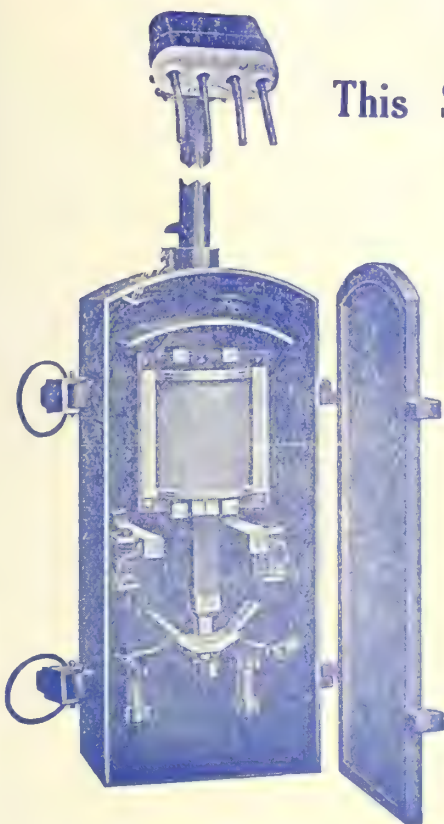
Canadian Westinghouse Co., Limited, Hamilton, Ont.

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**They use it for
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Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

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More popular than ever**

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Model C-6 Range
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A Gang's Work Is No Better Than Its Tools

GIVE your gang Northern Electric Tools—the complete line—resulting from years of study and first-hand practical experience in the field of line-construction, both telephone and power.

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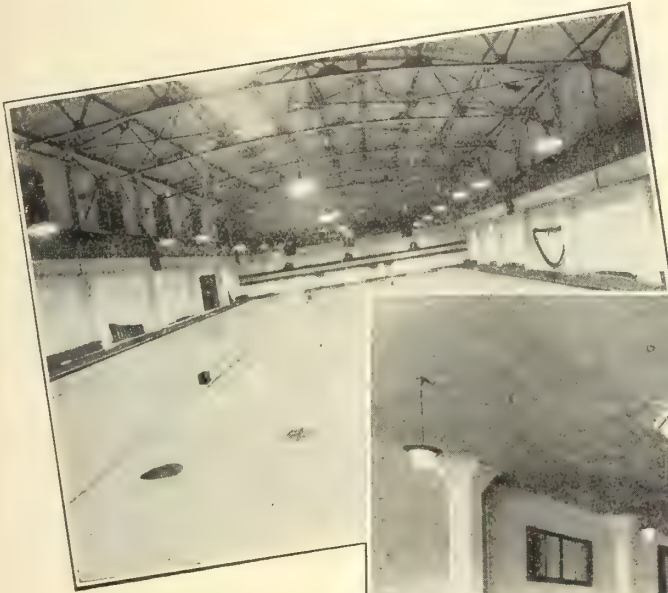
Stocks at our Houses anticipate your spring requirements. Write the one nearest you for shipment.

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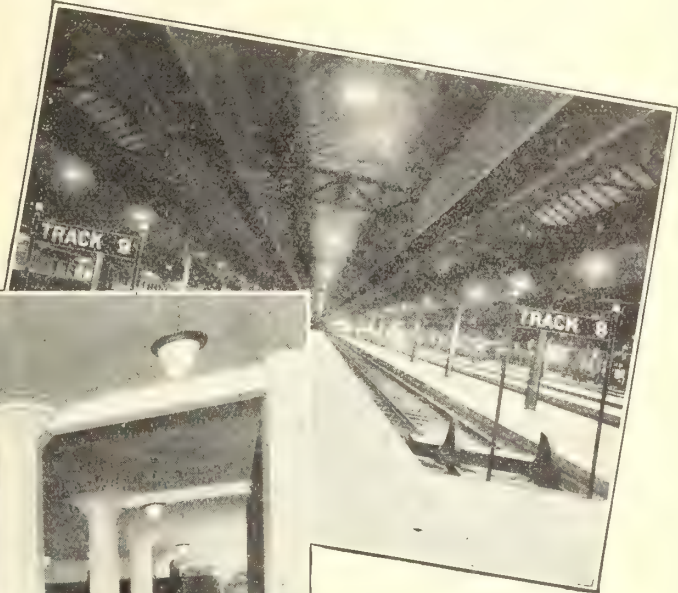
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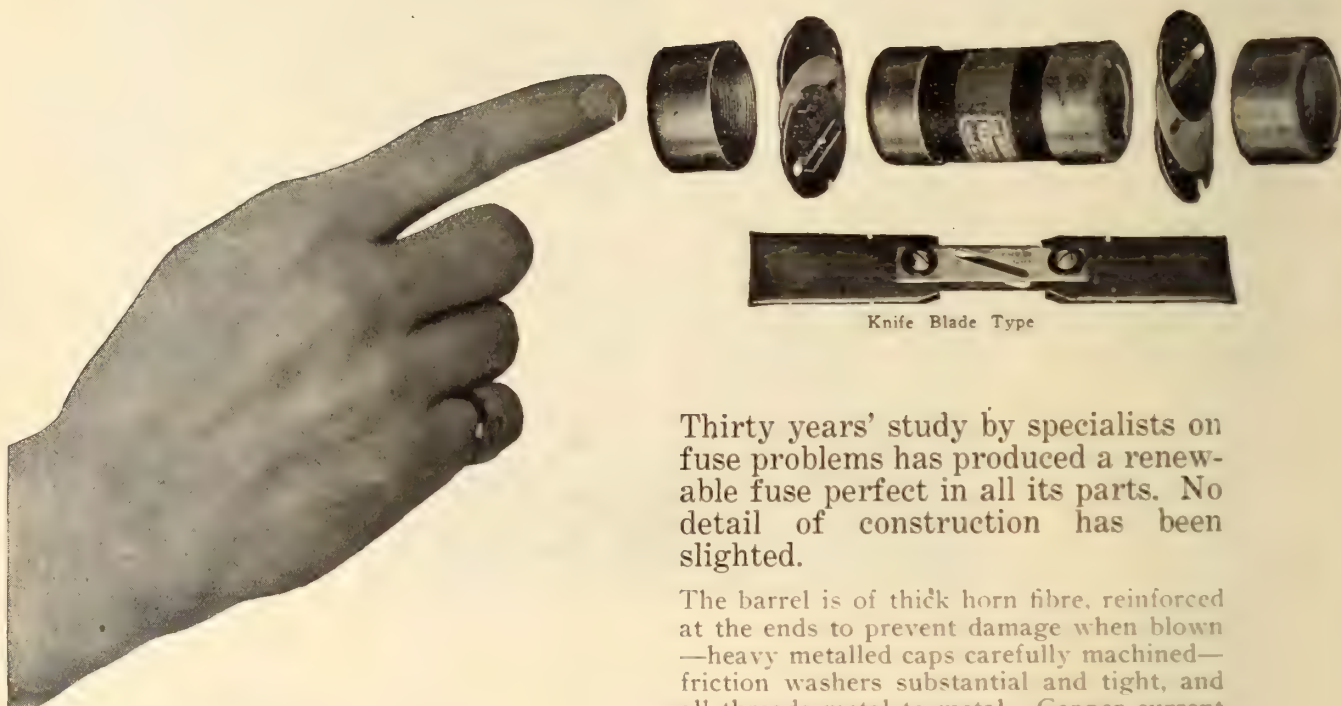
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Approved by the Board of
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A WIREMAN can go the limit on a fussy splice, but when it's all done, no splice is better than the tape it's wrapped with.

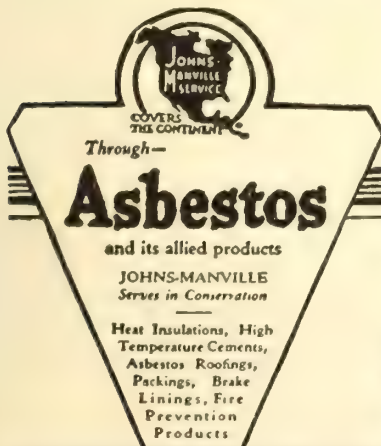
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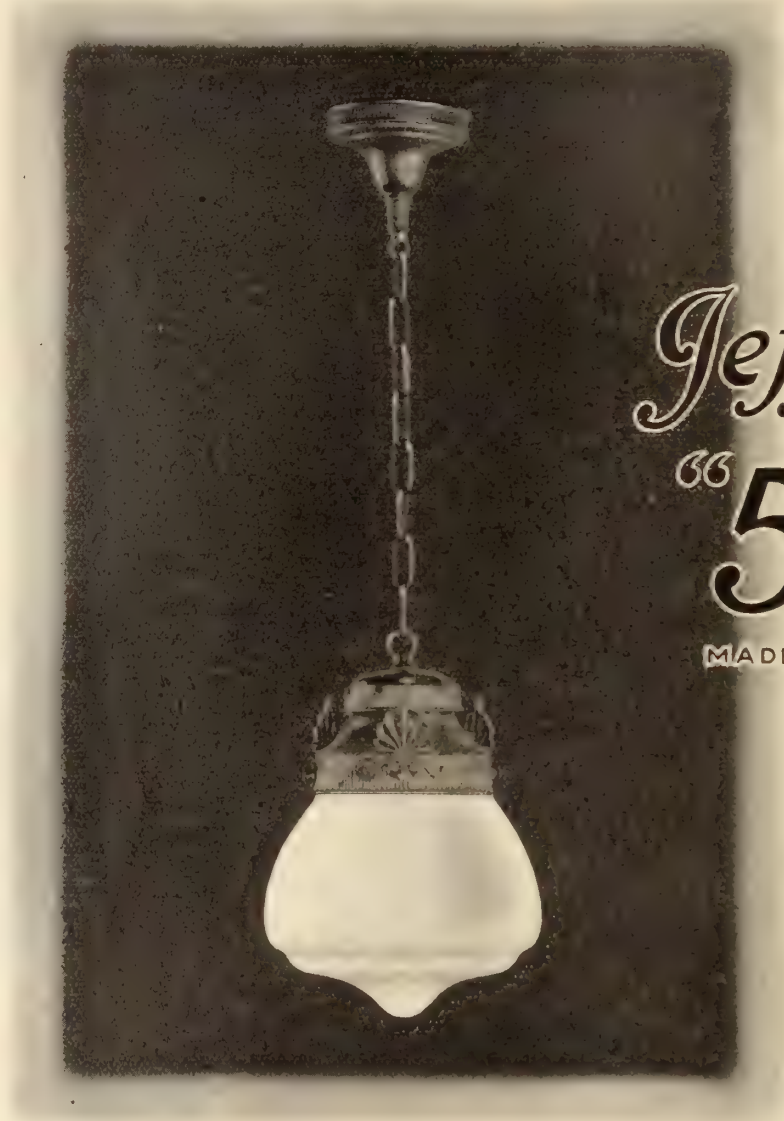
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Fool Proof Key Sockets

P & S Double Pole Movement a Safe Socket Movement

Perfectly safe to use—over Bath Tubs, Radiators, Metal Benches, Concrete Floors and Machinery.

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The Key Shaft or Mandrel is formed into a flat loop which gives maximum strength to the composition Key. The Key Shaft or Mandrel is journaled in rugged Porcelain on either side of the Center, passes through an insulating Cam and is never in contact with the current carrying parts of the movement.

2.—The Twin Phosphor Bronze Springs

The turn of the Key actuates Twin Phosphor Bronze Springs which "make" and "break" the circuit on both sides at the same time.

3.—Lamp Contacts Alive—Yet the Key is Safe

When the Key is turned on, the current flows into the Lamp Shell and Center Contact making them "alive."

4-5.—Lamp Contacts Dead—Full Protection

When the Key is turned off, the Lamp Shell and the Center Contact are both "dead." This means that all live parts of the Socket are out of reach and entirely concealed within the body of the Socket.
5—Dead Line.

Value of the Double Pole Movement

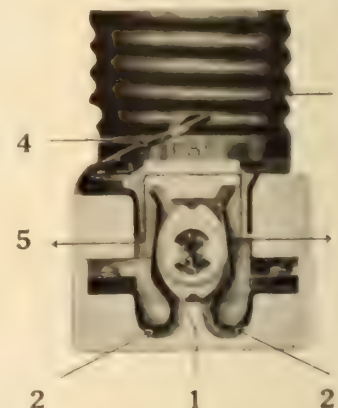
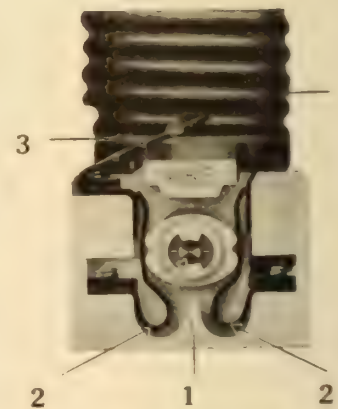
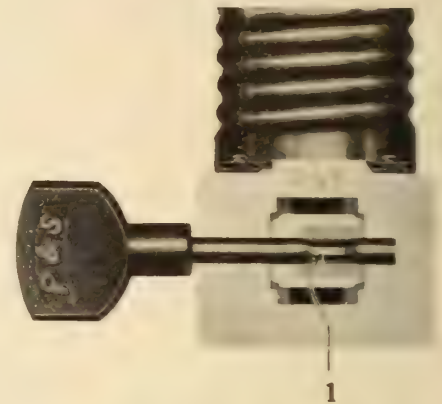
The Double Pole Socket is worth MORE yet costs the same as the ordinary Socket.

How to Recognize the Double Pole Movement

These refinements are indicated by the P & S Trade Mark on the Key.

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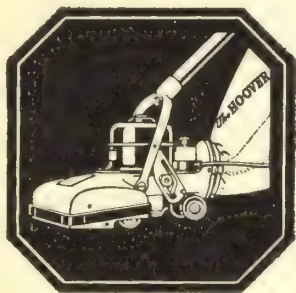


P & S Double Pole
Socket No. 100421

PASS & SEYMOUR, Inc.,

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One Dealer in Toronto on the Resale Plan during 1920, Exceeded \$60,000 in Hoover Sales!



Last year one dealer in Toronto averaged above \$5,000 a month on Hoovers alone. Yet this dealer was not our only dealer at Toronto. So the city absorbed far more than the 372 Baby Hoovers and 504 Hoover Specials sold through this single outlet in twelve months.

There is nothing occult in the attainment of such a volume of Hoover business. The merchandising factors that enter into the Hoover Resale Plan, on which this dealer operates, have been amply tested and proved.

Rightly applied, as the Hoover organization through its broad experience knows how to apply them, these same factors co-ordinated on behalf of your store, with equally sincere co-operation on your part will similarly succeed.

You need not be in a city the size of Toronto. Localities everywhere are absorbing Hoovers as successfully, in proportion to their electric-lighted population, as Toronto. The same tactics can be made to win in *your* town.

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and Executive Offices: Hamilton, Ontario

The HOOVER

It Beats . . . as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

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FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

"GALVADUCT"

GALVADUCT

The most perfect interior construction conduit on the market. The standard of high quality.



LORICATED

A high-class interior construction conduit of the enameled type. Proof against acid.

"A Galvaduct Building"
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"LORICATED"

Always Specify GALVADUCT or LORICATED
CONDUITS

If your jobber cannot supply you—write us

CONDUITS COMPANY

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National Two-Burner Hot Plates



The convenience of this stove is readily apparent—Compact, neat and attractive. Made in two finishes, nickel-plated and black Japan.

The Two-Burner Hot Plate has large cooking capacity constructed with heavier elements than the single disc. Extremely handy in small homes, or in schools where Domestic Science is taught.

National One-Burner Hot Plates



controlled by a three-heat switch.

These stoves are indispensable for light housekeeping and also for supplementing a Range where greater capacity is required. They are also suitable for Domestic Science Classrooms. Made in two finishes—nickel-plated and black Japan—neat and compact; and easily

National E05 Range

National ranges were thoroughly tested for years before they were perfected and put on the market. When an elevated oven is desired our model E05 fills the requirements perfectly and capably. This range occupies little space.

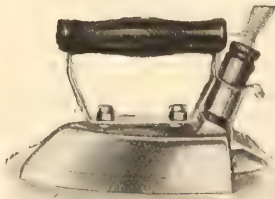


National Air Heater

To supplement the heat in a room or for heating small rooms this little Heater, which is one of the most popular types we make, will be found indispensable. It is built of the best materials and, thereby will give years of service. 660 and 880 watts capacity. 2 finishes—Japan with nickel-plated ends and all nickel.



National Irons



National Electric Irons are the highest quality irons manufactured, being the result of many years' experiment to develop a perfectly balanced and evenly heated iron.

The New National Electric MANTEL-TYPE GRATE

is the last word in an efficient as well as decorative grate.

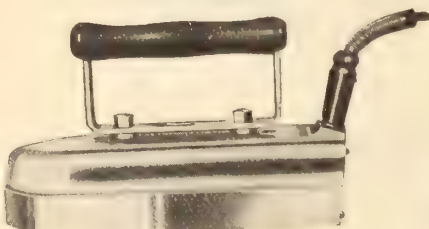
Made in Two Standard Sizes
24 x 30—2,000 Watts capacity, 2 Burners
30 x 36—3,000 Watts capacity, 3 Burners
Finished in all Standard Colors

THE NATIONAL ELECTRIC
TORONTO

627 Vancouver Block, Vancouver, B.C.

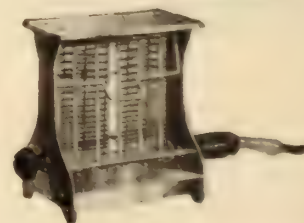
702 Confederation

National Tailor Iron



The National Electric Tailor Iron embodies the highest type of construction. Its superior qualities are recognized by the largest manufacturers in Canada, who are using hundreds of our irons. Supplied with Stand and 6 ft. Heater Cord with Attachment Plugs complete. Made in several sizes 12 to 22 lbs., also machine type.

National Toasters



The National Electric Toaster is a compact, efficient appliance for toasting bread. It is built of the best materials and, thereby will give years of service. 2 finishes—Japan with nickel-plated ends and all nickel.

National ELECTRIC Water Heater

For heating water in the kitchen tank is a convenience which will be appreciated in any household. Several years of experimenting were required to obtain this highly efficient and reliable heater.

Available in five sizes, from 660 to 3,000 gallons, 110 or 220 volts.



National ELECTRIC Electric Heatray

There's never an uncomfortable corner in the home where there's a Heatray. Instantaneous heat where and when you want it. The same electric service that lights your house runs the Heatray. Attach the plug, set it facing the uncomfortable spot and be comfortable. The few cents extra which the Heatray will add to your light bill will never be noticed, but the comfort it will bring will be a constant source of surprise.



The New National Electric OPEN-HEARTH GRATE

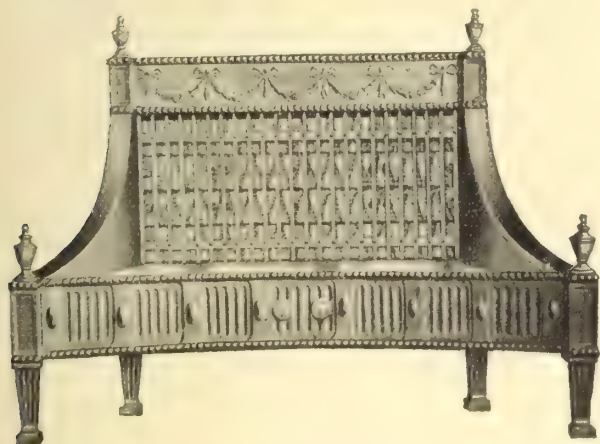
is now taking the place of the ancient odorous gas and dirty coal grates.

It can be used in open hearths or other mantels. Is massive in construction. Elegant in appearance and efficient.

It consumes 2,000 Watts and is controlled by 2 Tumbler Switches, 2 Heats.

Finished in any Standard Finish.

Size: Width, 30"; Height, 22"; Depth, 8".



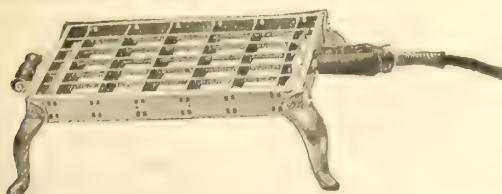
EATING CO., LIMITED
ONTARIO

King, Winnipeg, Man.

112 Crescent St., Montreal, P.Q.

National ELECTRIC Toaster Stove

Nearly every kind of simple cooking may be done, with absolute perfection, on the National Toaster Stove. It has a hundred uses in every home. It is compact and attractive. Easily kept clean owing to removable bottom.



National ELECTRIC Ranges A4 Range



No other invention of modern times surpasses the electric range. Cooking with a National Range is surprisingly economical, due to the scientific construction and control. The A4 range is suitable for large families. It is built very substantially of high quality metals and will give years of service.

National ELECTRIC Disc Stoves

These disc stoves are very useful and convenient. The 5" and 6" Disc Stoves are supplied with 6 ft. Heater Cord and Plugs complete. The 8" Disc Stove is supplied with Cord and Heater Plug but not Attachment Plug.



National ELECTRIC C6 Range



Every National Range is thoroughly tested before it leaves the factory and each of the Elements carry a one year guarantee. Every precaution is taken to make National Ranges strong, safe, sanitary and efficient; built up to a standard, not down to a price. For those desiring a cabinet range our Model C6 will be found very suitable.

National Ranges are made in many styles and sizes. There is a National Range for every requirement. Write for special Range Booklet.



HIGH TENSION EQUIPMENT



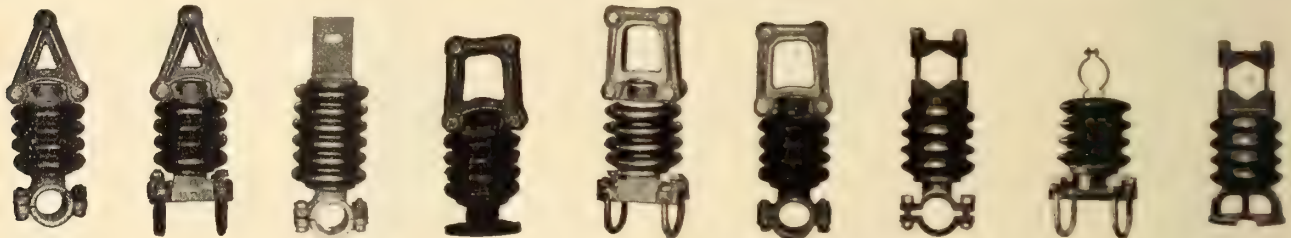
Has This Been Your Experience?

A power company in a moderate sized city built a new plant which their engineers thought would be of ample capacity to take care of their load for many years to come. But, as usual, the unexpected happened.

Oil was discovered in the territory.

The city and vicinity increased in population at a rate which staggered the older residents and kept the power company's engineers hustling. As the load grew, extensions to the plant followed one another rapidly. Outlying sub-stations were built and transmission lines reached out and gathered in the oil field load.

Naturally, with the growth of the system, many necessary changes were made in equipment. Busses had to be increased in size and rearranged. Before long it became advisable to raise the operating voltage, in order to feed the growing city sub-stations economically.



Unit type bus supports are furnished with interchangeable fittings at both ends. A change in type or size of busses, or method of mounting, means only the work of unscrewing one fitting and screwing on another, placing the original fitting in stock where it is available for use elsewhere.

Increases in voltage are easily taken care of by simply increasing the length of porcelain—screwing two parts together.



In a few years the main storeroom of the company resembled a robber's warehouse. Overcrowded bus supports of all shapes and sizes took the place of those of their second-hand kind, and the possibility of the ever-present possibility of a shortage of stock was a most undesirable factor in the company's affairs.

The contents of that storeroom represented a sum which would have been more advantageously stockholders in the form of dividends on common stock.

Such a state of affairs is no longer necessary. The development of the unit type bus support makes it possible to quickly and economically change old equipment to meet new conditions and to reduce stocks of spare units to a minimum.

Another important factor is, that these same insulator units are interchangeable with those on disconnecting switches and all other indoor equipment.

Store room stocks can be reduced to a few spare insulators, any of which are available for instant use in any station on the system.

Thus Unit type bus supports are always worth 100% of their original cost—the depreciation is practically nothing.

Profit by the experience of others and on your next installation use bus supports which will be suitable for future as well as for present requirements.

Write for Bulletin No. 31

DELTA-STAR ELECTRIC CO., CHICAGO

REPRESENTED IN CANADA BY

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents: Frank Darling & Co., Ltd. Vancouver General Supplies Ltd., Calgary F. H. Girdlestone, Confederation Life Bldg., Winnipeg

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Windsor Ont.

Head Sales Office

1221-2 Bank of Hamilton Bldg., Toronto

DELTA-STAR HIGH TENSION EQUIPMENT



UNIT-TYPE INTERCHANGEABLE PARTS





**A Tremendous number of
Blue Birds will be sold
this year**

The women of Canada understand: the drudgery of old-time wash-day must go!

The profit to be made by the sale of BlueBirds challenges your interest.

Lay your plans.

Secure your BlueBird selling license from your Electrical Jobber—or write to us direct.

We will tell you in detail the advantages and possibilities for profit in your holding the Agency for

THE
COLONIAL MAID

Blue Bird

Electric Clothes Washer and Wringer

We have perfected our distributing arrangements—you will receive your orders promptly.

Time Payments

You can sell the BlueBird on deferred payment plan. Small cash payment, balance in small monthly instalments. Let us give you the details of our time payment sales. By this plan all your customers are "prospects."

The BlueBird is all Canadian made. It is the strongest, handsomest, most efficient clothes washer made in any country. It gives a lifetime of service and carries our guarantee.

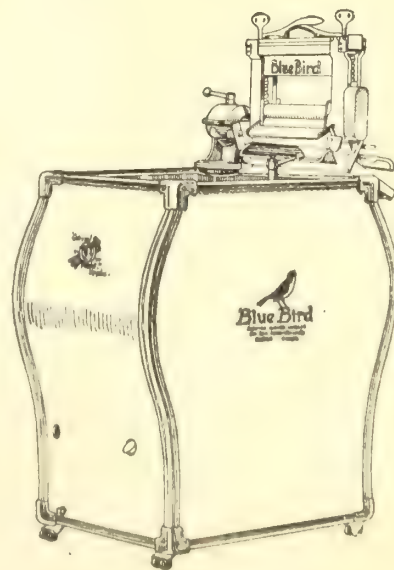
The BlueBird is a satisfactory and profitable article to sell. It builds custom and goodwill.

APPLIANCES LIMITED.

General Sales Agents for Blue Bird Corporation.

Aladdin Bldg., 208 King St. West, TORONTO

304 Montreal Trust Bldg., WINNIPEG, MAN.



READY!

The Metal Molding Hand-Book

"For the Man on the Job"

Every contractor and wireman in the business needs this new Hand-Book—the most complete book ever issued on the subject of metal raceways for surface wiring. It gives full instructions—with many illustrations—for using National Metal Molding under all conditions. It also lists the various fittings and devices that are used in connection with Metal Molding. Because of its convenient size, the book can be easily carried and used right on the job. We will be glad to send you a copy, without charge. Write, or use the coupon below.



Fill in, tear out and mail this coupon

National Metal Molding Co.
12th Floor, Fulton Bldg., Pittsburgh, Pa.

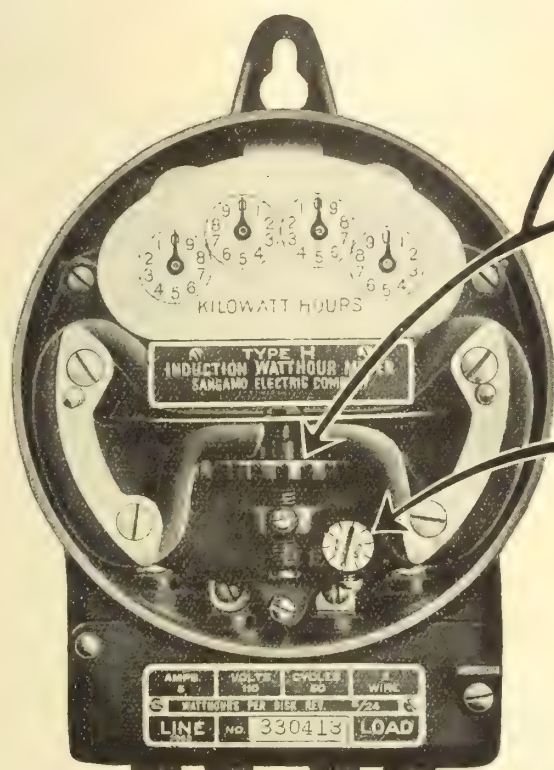
Please send me a copy of your new Metal Molding Hand-Book "For the Man on the Job"

Name.....

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Adjustment Simple & Easy



**Full Load Adjustment
Loosen Clamp Screw
and Turn Disc**

**Light Load Adjustment
Graduated Micrometer**



The Sangamo method of meter adjustment on the Type "H" alternating current Watthour meter eliminates all guesswork. It provides a positive, easy and simple means of adjustment which saves time and trouble.

Light Load Adjustment, as shown in the above illustration, is accomplished by loosening a clamp screw and turning the micrometer screw a fixed amount for each per cent of desired correction. One complete revolution of the micrometer screw produces an approximate change of $2\frac{1}{2}$ per cent. Consequently each divisional turn is equal to $\frac{1}{4}$ of one per cent change.

Full Load Adjustment is accomplished by loosening the clamp screw and turning the iron disc indicated above. Turning the

iron disc one way brings it closer to the magnets, thereby shunting magnetic flux away from the disc and speeding up the meter. Turning it the other way moves the iron disc a greater distance from the magnets, strengthens the damping flux through the disc and slows up the meter. When adjustment is completed the clamp screw locks it in position. **All this is accomplished without moving the magnets.**

After the meter is once adjusted the entire moving element may be removed without affecting the accuracy of any adjustment.

Simplified adjustment is only one of Sangamo features which you will appreciate. Let us send you full information on Type "H." Ask for Bulletin No. 4618.

Sangamo Electric Company of Canada, Limited

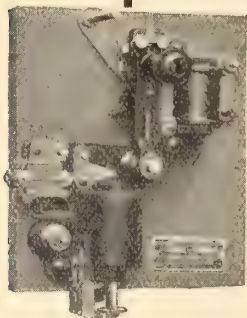
Factory: TORONTO

Head Sales Office: MONTREAL

Battery Charging Circuit Breakers



The Ford Motor Co. plant, Detroit, showing Ward Leonard Circuit Breakers Used on Their Battery Charging Panels



Ward Leonard Circuit Breaker Switches Closed



Ward Leonard Circuit Breaker Reverse Current Switch Open



Ward Leonard Circuit Breaker Overload Switch Open

The Ward Leonard Circuit Breaker is the dependable protection, in battery charging circuits, against overloads and discharge of batteries.

The Ward Leonard Circuit Breaker is made up of two switches, one with a reverse current trip and the other with an overload trip, and these two switches are connected in series in such a way as to give the same advantages as are obtained with double-pole circuit breakers. Also they provide for reverse current protection in addition to overload protection.

These two switches are so interlocked that the over-

load switch must be closed first and cannot be closed when the reverse current switch is closed. Therefore, if there is an overload on the circuit when the reverse current switch is closed, the overload switch opens immediately. Thus the batteries and the entire circuit are completely protected even against careless or intentional misoperation.

Ward Leonard Circuit Breakers are used on all Ward Leonard Battery Charging Panels equipped with protective devices. They are so designed as to form a practical adjunct to any battery charging panel. Let us tell you all about them and their use in battery charging stations.

Ward Leonard Electric Company

LOCATED 150 FEET NORTH OF NEW YORK CITY, IN

MOUNT VERNON

NEW YORK

2068

Packard
TRANSFORMERS

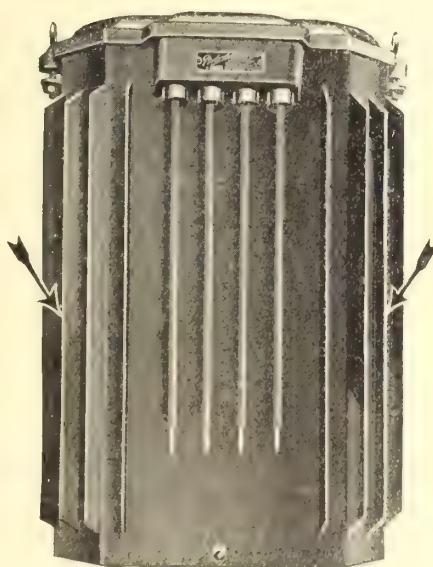
LOOK! Something New!!

Heat Dissipators

ON OUR

Welded Steel Cases

ADVANTAGES—Smaller Transformer, Less Weight,
Lower Temperature Rise, Greater Overload Capacity



Others may follow, but we lead.

The Packard Electric Co., Limited
St. Catharines, Ontario

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Agents:

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W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.

"TRICABLE"

Flexible Steel Armored Conductors



"TRICABLE" is now Made in Canada. On your next installation requiring this class of material, specify to your jobber "Tricable." Immediate delivery all sizes up to and including Three Conductor No. 4.

Advantages of "TRICABLE" installations:

Extreme Flexibility, Absolute Uniformity, Low Cost, Neat Appearance.

Quality, Service and Economy are what you are assured by using Triangle Products. See that you get them.

- "TRICABLE" (Flexible Steel Armored Conductors)
- "TRISTEEL" (Flexible Steel Conduit)
- "TRIDUCT" (Flexible Non-Metallic Conduit)
- "TRIHOSE" (Flexible Metallic Gas Hose)
- "TRITUBE" (Flexible Metallic Automobile Tubing)
- "TRICORD" (Hard Service Portable Cord)

Exclusive Selling Agents:

Conduits Company Limited

33 Labatt Avenue

TORONTO

How often do you "Ring the Bell" ?

your aim in selling cleaners is to "ring the bell" every shot. When the cash register says "Clang!" you know you have scored a bull's-eye.

Dealers who handle the ROYAL hear this sweet music very often. It's not entirely because the ROYAL is a mighty good machine—the very best machine, we honestly believe — nor because the ROYAL is so extensively advertised. The real reason why the ROYAL sells and why ROYAL dealers prosper is because the

rugs to bare linoleum or even concrete.

There recently have been held a number of electric cleaner "contests" in which various machines have competed. So far as we know, the ROYAL always wins. It can do all the "stunts" devised by tricky salesmen.

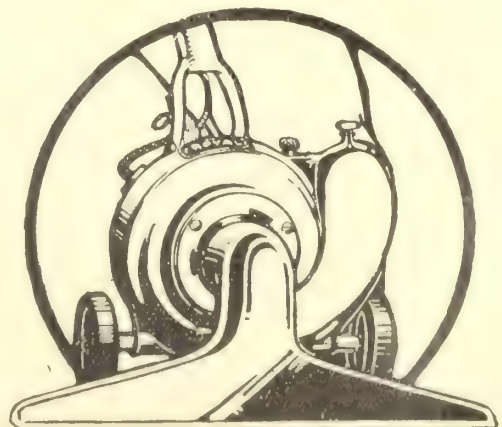
But "stunt" demonstrations don't mean much to the housewife. When she comes to you to buy she wants a cleaner that will clean her home, and when you sell her a ROYAL you are able to prove to her that it is the very best home-cleaning machine made.

Then, "Clang!" says the cash register, and you know you have "rung the bell" again.

ROYAL
QUALITY SERVICE
ELECTRIC CLEANER

is the housewife's ideal of what a cleaner ought to be—light, graceful, simple and handy, yet a cleaner that does its work thoroughly and does all kinds of cleaning from heavy Wilton

Great West Electric
Company Limited
Winnipeg Manitoba





It Gets the Dirt
Not the Carpet

Attractive, Isn't It?

STRIKING window displays are just one part of the complete sales assistance furnished to Eureka dealers. In addition to the periodically renewed display material, suggestions for unique and attractive trims are supplied every month by an authority engaged for the specific purpose of turning Eureka windows into Eureka salesmen.

Always available to Eureka dealers are several newspaper campaigns, street car cards, window and counter displays, moving picture slides, a variety of booklets, and a helpful monthly sales magazine.

Eureka dealers have always been carefully chosen. As a result, our sales have mounted steadily and our dealers have prospered. But some profitable territory requires additional dealers and we want to hear from individuals and corporations who operate on a sound basis and who know how to properly sell a cleaner whose popularity and superiority were established many years ago. For such men we have an interesting proposition.

EUREKA VACUUM CLEANER COMPANY
KITCHENER, ONT.

Winner of Grand Prize at the Panama Pacific Exposition, San Francisco, Grand Prize and Gold Medal at Brussels, Belgium, February, 1920, and Grand Prize and Gold Medal at Milan, Italy, July, 1920

EUREKA
Draws the
Air Clear Through

We wish to advise our customers that until further notice we shall continue to accept Canadian funds at par, investing the same in Canadian securities.

The Cutter Company

Bank of Hamilton Building
Toronto, Ont.

Main Office and Factory:
Philadelphia, Pa.



I-T-E
Circuit
Breaker
Engineers

High-Type INSULATION



for exacting demands

IS your problem one of superior insulation? Is it one of finding a material of high dielectric strength?

Do you require a material that is tough and strong? One that will not crack, chip, break or deteriorate with age and usage? Must it be adaptable to bending, twisting or forming? Is easy machinability and fine finish a factor?

Diamond Fibre will fulfill all these requirements and more. It does better work at less cost than other material. Supplied in standard sheets, rods or tubes or machined by us to your specifications.

If you want further information about Diamond Fibre, write for our new illustrated catalog. It will show you why and how Diamond Fibre can be economically used in your particular business.

Diamond State Fibre Company
of Canada, Limited

Wrigley Building, TORONTO
Carlaw Avenue, CANADA

"Totally Enclosed"



*Canadian Crocker-Wheeler 1/4 h.p., 110 Volts, 60 or 25 cycles,
Totally Enclosed Motor*

"Superiority"

Superiority at all points is apparent in this Canadian Crocker-Wheeler 1/4 h.p. single phase motor. Being "totally enclosed" it is dirt and dust proof and sheds water like a mallard. The successful Crocker-Wheeler cast winding construction for the rotor is used. These features, together with its high starting and working torque, make it emphatically the motor for long and vigorous service in the hands of the inexperienced.

Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

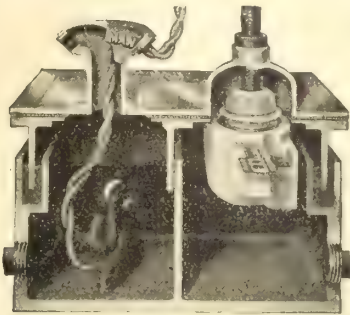
Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL

Fullman Floor Outlets

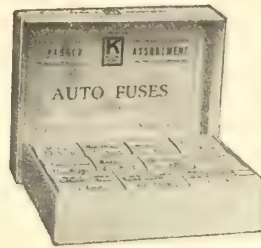
Two to Six Sections
ADJUSTABLE COVERS



There is no floor outlet job that the Fullman will not do, better and more economically.

Write for Complete Catalogue.

STEEL CITY ELECTRIC COMPANY
PITTSBURGH, PA.



**Here's
Your
Entire
Auto Fuse
Department**

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment
"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

FERRANTI METERS

Ferranti Meters are made to give a permanent service in constant accuracy.

Their actual record in the electrical field proves that they unfailingly serve the purpose for which they were made. They are specified where only the utmost in efficient accuracy is tolerated.



WATT METER

Ferranti Meter & Transformer Mfg. Co. Ltd.

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Simpson Bldg
HALIFAX

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Northwestern Engineering & Supply Co.
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Northern Ontario
J. P. Bartleman
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MADE IN CANADA CARS



**Electric City and
Interurban Passenger
Cars**



**Electric Locomotives
Sprinklers
Work Cars
Sweepers
Snow Plows**



Your community demands that the most vital factor in its progress, namely, Electrically Operated Transportation System, be one of highest efficiency, scientifically linked with lowest upkeep cost.

We invite your inquiries with view to offering free consultation, specifications, drawings, estimates and prices.

Satisfaction guaranteed on all orders and deliveries to suit customers' requirements.

Ottawa Car Manufacturing Co. Limited
OTTAWA, ONT.

G. M. Gest, Limited

Contracting Conduit Engineers

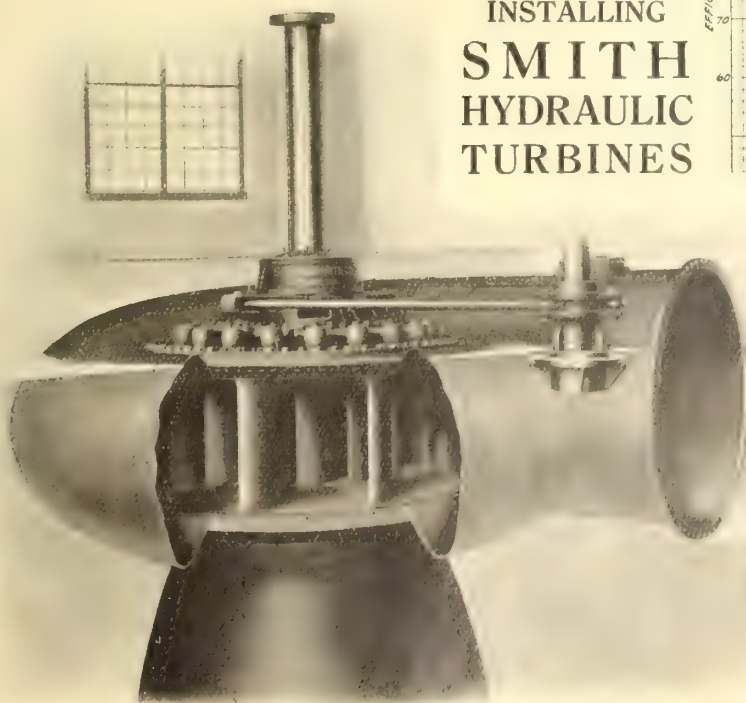
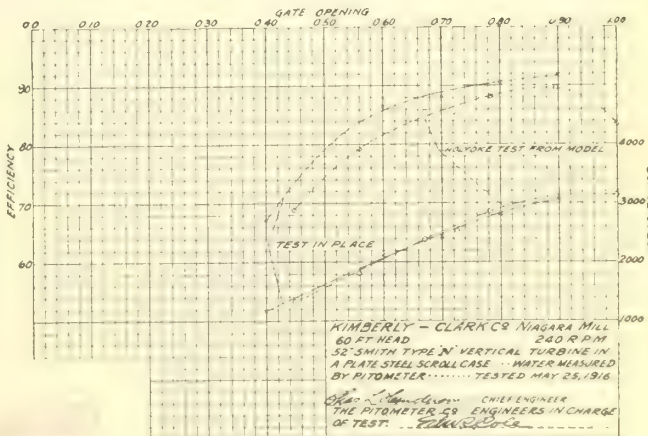
Head Office
Power Building
Montreal

Vancouver

Winnipeg

RESULTS

JUSTIFY
INSTALLING
**SMITH
HYDRAULIC
TURBINES**



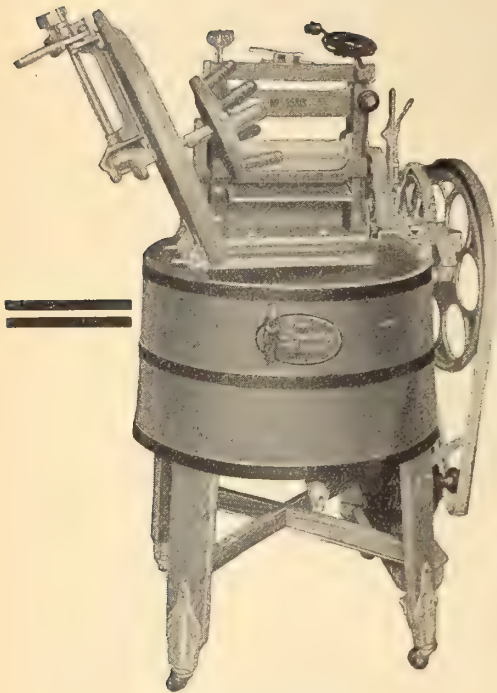
The year 1921 has on its
program an immense amount
of

**WATER POWER
DEVELOPMENT.**

If interested, ask for Bulletin "N"

S. Morgan Smith Co.
York, Pa., U. S. A.

H. B. VAN EVERY, Representative
405 Power Building - MONTREAL



Our motto—"Efficient Service"
—is backed by a liberal guaran-
tee which enables you to give
perfect customer - satisfaction.
We give prompt shipment of
your order.

Do You Sell Happiness?

HAPPINESS as a single commodity would sell at a big premium, wouldn't it? But it cannot be sold that way, so it remains for dealers who handle happiness-promoting equipment, like the Miss Simplicity Electric Washer, to reap the profits of this market.

Attractive four-color folders explain clearly and convincingly the merits of Miss Simplicity. With your first order we will send you a supply imprinted with your own name and address.

Miss Simplicity **does** promote happiness. Miss Simplicity gives happy release from all the drudgery of wash day, yet insures the economies of home washing. Every housewife without an electric clothes washer in your community is a prospective purchaser.

Miss Simplicity is easy and simple to operate. The mechanical features are beyond question. Workmanship and materials are as perfect as honest Canadian effort and good Canadian capital can make them.

Miss Simplicity sells at a very attractive price and there is handsome profit, quick turnover, and sure customer-satisfaction for you. Write to-day for our dealer offer. It will certainly interest you.



W. A. KRIBS COMPANY LIMITED

Hespeler, Ontario

Great West Electric Company, Limited, Winnipeg, Western Distributors.
Northern Electric Company, Montreal, Distributors for Quebec.



Quiet Operation

THE unusually quiet operation of the R & M Fan is not only a feature which has a very strong appeal in itself, but when the dealer points out to the customer that such operation is absolute proof that the fan is perfectly balanced and the parts are accurately

fitted, it has a double appeal which is very effective.

Every customer can understand readily that perfect balance with consequent freedom from vibration, together with accurate workmanship, means reliability and long life. And this is something everyone wants when purchasing a fan.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans

QUALITY COUNTS

YOUR customer invariably wonders, "Am I getting my money's worth?" whenever she buys.

At the moment she doesn't know. She can't tell. But in a week, or a month, or a year, she **will** know, because the **quality** of the article will have made itself felt.

If the quality proves to be high, your one-time buyer will come for more, because she "got her money's worth" the first time.

But if the quality was lacking she'll start nosing around looking for a **quality shop**.

This is especially true of electrical appliances. What is your stock like? They may **look** fine, but what will they **do**?

If you carry the new Canadian Beauty line you are perfectly safe, for we have rigidly insisted on turning out appliances of the very highest quality only.

The public will spot the new Canadian Beauty Appliances right away for their "good looks." They have a smooth finish, brilliant polish, graceful lines, atmosphere—

Their "good looks" will **sell** them and their splendid quality will **keep** them sold. Your customers get "their money's worth." They'll surely come back for more new Canadian Beauty Electrical Appliances.

And they are right up to the minute in improvements. No worth-while feature is lacking. The new Canadian Beauty line is the last word in electrical appliance perfection.

Order through your jobber, or if he cannot supply you, direct from us.

RENFREW ELECTRIC PRODUCTS CO., LIMITED

Head Office and Works: Renfrew, Ont.

29 Richmond St. West, TORONTO, ONT.

803 Lindsay Bldg., WINNIPEG, MAN.

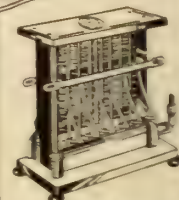
The New

Canadian Beauty

Electrical Appliances

Renfrew
Electric
Products
Limited
Renfrew, Ont.

Canadian Beauty



Toaster

Canadian Beauty



Three-heat
Grill

Canadian Beauty



Iron

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Stove

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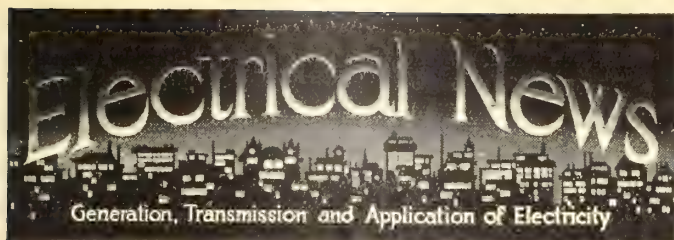
Maestec
Heater

Canadian Beauty



Percolator

Canadian Beauty



For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

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Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for \$2.00 per annum. United States and foreign, \$2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean, Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, April 1, 1921

No 7

We "Talk" Co-operation, But "Act" Disintegration

A small village in the Peterboro Lake district of Ontario has a population of about a thousand people. This village has its own electric light plant. There is also established in this place an electrical contractor-dealer endeavoring to eke out an existence from the patronage of somewhere about three hundred homes. One can readily imagine his turnover is not very large, and that he needs all the assistance the electrical industry can give him.

What help does he actually get?

Competition — that's all. The manufacturer and wholesaler, apparently feeling that the only way to properly stimulate business in this little burg is to create a healthy sales rivalry, have placed a stock of electric goods with the hardware dealer, and, not content with that, they have enlisted the sales co-operation of two so-called general stores, and the drug store also displays an occasional flashlight. The sum total of the whole matter is that the contractor-dealer barely holds body and soul together. He has to meet the prices of his competitors and at the same time suffer from the unpopularity of the electrical business due to their lack-of-service methods.

The hardware man sells electrical goods as a side line. Because they are attractive in appearance he figures they bring him in some extra customers, hence he sells them on the narrowest possible margin. He does not sell service with his electrical goods for the simple reason that he has no facilities for giving that service. He has no interest what-

ever in the electrical business. He would as soon sell a coal oil lamp as an electric bulb; a hand, gasoline or water-operated washing machine as an electric washer; a gas range as a coal range. He doesn't enter into the spirit of the electrical business because he has no knowledge of its present possibilities, no vision of its future. Yet this is the type of dealer some of our manufacturers are entrusting with the distribution of their goods. Such manufacturers, we believe, are building for to-day and to-morrow, but not for a year or five years hence.

We know the answer—excuse—that is always advanced, of course—the electrical dealer isn't so good a credit, isn't as experienced a business man. Let us, in all fairness, ask ourselves—"Are we improving him as a credit when we surround him with unfair competition? Are we supporting him in such a way as to develop him in proper business methods?"

Co-operation has been talked to death. We rant about getting together, working together, supporting one another, and as soon as the convention is over it is all forgotten. The electrical trade knows well that the weak point in our industry is our retail selling organization. How is all our boasted co-operation helping to improve the situation? Up to the present time the answer seems to be—"By merchandising our goods through hardware and general stores, by withholding support from electrical retailers and on every opportunity making derogatory remarks about their financial standing and their ability as merchandisers."

As an industry we are still about the most disjointed, least cohesive thing in the world to-day.

Prosperous Rural Conditions Big Asset to Towns and Cities

There is a big fight on at the moment between rural and urban interests as to whether rural districts, being less advantageously situated by nature for obtaining a supply of electric power, are justified in asking the towns and cities to pay a portion of the cost of rural distribution.

There are many angles to the question and reasonable arguments can be advanced from both sides. On the one hand, there is depletion of the farms, difficulty of getting help, the necessity for making rural life more attractive, the absolute urgency of increasing farm production, all of which is influenced very directly by an easier supply of electric energy on the farm for light and power. Another argument that must have consideration is the fact that the credit of the Province as a whole which includes the farms as well as the cities, is pledged financially to see the provincial hydro system carried to a successful issue, and the farmer may well ask with some degree of fairness whether he should not get a certain consideration in return for the use of his credit.

On the other hand, it is argued that this suggestion of bonusing the farmer is in the nature of a flat rate for power, and that if a flat rate is the right idea for power as between city and country it is equally the right idea between one city and another city. Followed to its logical conclusion, if a flat rate is right as regards power it is right as regards all other commodities, whether produced in the city or the country. This essentially means that the rural districts must be taxed to supply the city dwellers with farm products at the same price as prevails at the farmer's gate. We thus arrive at a ridiculous conclusion, the result, as Euclid, long ages ago taught, of a ridiculous hypothesis. The effectiveness of the many arguments that may be advanced on either side seems thus to depend largely on whether one is a country or city dweller, and perhaps, after all, the best arrangement will be a friendly compromise. It may be hard to justify the farmer's "right" to a bonus, but on the other hand, all city men must agree that cities and towns flourish

in proportion as the surrounding country is prosperous, contented and productive. Thus, it would seem that a measure of assistance in the matter of electrical supply to the rural districts is worth consideration. What the exact amount may be is difficult to determine. The rate of two dollars per horsepower suggested by the Government committee seems not to be justified, as this would be a heavy penalty on many town and city systems now doing little better than making ends meet. It is worth considering, however, that the disadvantages of more expensive power to any city or town may be offset by the greater prosperity of the surrounding country. We can't overlook the fact that Canada is, first, an agricultural country and that the success of that basic industry must always measure, in a very high degree, the success of all our other industries.

Electric Club Hears About Hydro Laboratory Work and Facilities

At the March 11 luncheon of the Electric Club of Toronto, Mr. W. P. Dobson, director of the industrial research laboratories of the Hydro-electric Power Commission of Ontario, outlined the functions and facilities of his department. Lantern slides of various equipment and operations were shown so that the members were able to carry away a very definite and logical idea of the valuable work in the way of research being accomplished by the Commission under Mr. Dobson's able supervision.

It was pointed out that the work of the Hydro laboratories did not duplicate or overlap in any way with research work at present carried out by our universities, nor with the work for which it is proposed to establish Government industrial laboratories at various points in Canada. The university laboratories are essentially for pure science; the proposed Government laboratories are specially needed to care for the general industrial problems such as confront the many manufacturing and construction industries throughout Canada. Between these two extremes comes the Hydro laboratories, a judicious admixture of theory and practice with special application to the electrical industry—the application of theory to practice and the verification of theory in practice. Following Mr. Dobson's descriptions the members of the industry in Toronto realized as they never did before the valuable work being accomplished by the Strachan Avenue staff.

The Friday luncheon of the following week was addressed by Mr. John Z. White, Chicago, on "The Relation of Taxation to Community Developments."

Switching Equipment at A.I.E.E.

The Toronto Section of the American Institute of Electrical Engineers held a regular meeting on March 18, at which Mr. L. B. Chubbuck of the Canadian Westinghouse Company, Hamilton, gave an illustrated address on the subject "Switching Equipment."

Mr. Chubbuck had collected a large number of slides, illustrating switching connections and apparatus in the power houses of the Niagara Falls Power Company, the Shawinigan developments, the Hydro-electric Power Commission of Ontario, the Ontario Power Company, and other plants. He showed, also, a number of views of late developments in English and United States switching equipment, with particular reference to the advantages of resistance and reactance types of breakers. After the slides, he also showed the films recently presented at the Midwinter Convention of the Institute, illustrating the operation of circuit breakers and fuses under abnormal overload conditions, which films Mr.

Chubbuck had obtained through the courtesy of Mr. Torchio Messrs. Amos, Don Carlos, H. M. King, Cooper, Henderson, Stevenson, H. W. Price, C. A. Price and Hull participated in the discussion which followed the lecture.

A letter was read from the secretary of the Advisory Council Committee on Engineering Legislation, requesting the co-operation of the membership of the Section in bringing the "Act Respecting the Engineering Profession" to the favorable attention of the members of the Legislature.

Nova Scotia Forms Electrical Association—Who Is Next?

As briefly announced in our last issue, the electrical men of Halifax, N.S., have formed an Association to be known as the Electrical Association of Nova Scotia. The organization followed a banquet of prominent electrical men on the evening of March 1st.

Of course, a great deal of preliminary work had been done preparatory to the formation of the organization. Mr. W. Murdock, district manager of the Northern Electric Company had been meeting with an enthusiastic committee for some time, and the support given to the movement by the hundred odd delegates present must have been very gratifying to Mr. Murdock and his committee, not only as an appreciation of their work but as indicating the spirit of



Mr. W. Murdock

co-operation existing in this industry in the Maritime Provinces.

Among the prominent electrical men who are lending their support to the new Association, in addition to Mr. Murdock, are included W. L. Weston, manager of the Nova Scotia Tramways & Power Co.; W. M. Godsoe of the C.P.R. Telegraph Co.; K. H. Smith, engineer of the Nova Scotia Water Power Commission; C. C. Starr, of John Starr & Co., Ltd.; James Farquhar; Mr. Fassett; W. S. Emery of the C.P.R. Telegraph; Mr. Knight; A. S. Priest, an architect; Mr. Colpitt, city electrician of Halifax; Mr. Lockhart, John Starr, Son & Company, Ltd.; E. J. Cragg, of Cragg Bros., Co. Ltd.; J. T. Dorey, of Dorey Electric, Ltd.; Frank Arthur, of Arthur & Conn, Ltd.; Philip Freeman, general superintendent of the Nova Scotia Tramways & Power Co., Ltd.; Chas. Garroway; W. Spruin; Mr. Redmond; Mr. MacCrae, of Dartmouth; Mr. Barnes, of the Imperial Oil Co.; E. Seith; Mr. Baker, of the Northern Electric Company and C. H. Wright, of the Canadian General Electric Company.

Hydro-Electric Progress in Canada During Recent Past

650,000 H.P. Completed or Under Construction—Active Government Development of Power Resources—Canada Second Only to Norway in Amount Developed Per Capita

By J. B. CHALLIES

Director of Water Power, Department of the Interior, Ottawa

IN spite of the outstanding facts that financial and commercial conditions are still far from normal and that costs of construction are prohibitive for all but absolutely necessary undertakings, a review of the year's work in hydro-electric matters in Canada shows considerable progress and encouragement for the future.

The rapid advance made during the past year or two by all the principal water-power countries of the world (some 15), in realizing the compelling necessity of developing their power resources if they are even to hold their own in competition for the world's trade, has been shown by almost universal legislation to this end, and in all those countries the governments are either themselves undertaking power development or directly assisting in the finance.

This widespread and aggressive movement in other countries makes it specially desirable to review what progress is being made in Canada. To do this we may proceed from east to west, taking each province as it comes, and giving in conclusion a general summary of the progress of the year.

Nova Scotia

In 1914 the government of this province created an investigatory body known as the Nova Scotia Water Power Commission and shortly after entered into a co-operative agreement with the Department of the Interior for the investigation and analysis of its water-power resources by the Dominion Water Power Branch. These investigations showed such facilities for development that in 1919, under the "Power Commission Act" then passed, the Nova Scotia Power Commission was formed to develop and distribute hydro-electric and steam power throughout the province, with the ultimate view of a complete interconnected system. Other acts were also passed to assist the government to remove restrictions due to existing rights in navigation, lumbering, mill and fishing privileges, riparian rights, etc., in order that comprehensive plans for the best use of the streams could be carried out.

Since that time progress has been rapid. The first projects undertaken by the Commission and commenced in 1920 were the St. Margarets' Bay development, to supply the city of Halifax, and a hydro-electric system for the county of Lunenburg.

The St. Margarets' Bay Project

The St. Margarets' Bay development is the first hydro-electric plant of considerable size in the province. It consists of two separate generating stations: "Tidewater generating station" at the head of St. Margarets' Bay near the mouth of Northeast river, designed to give 6,900 h.p., and the "Mill Lake generating station" on Northeast river to give 3,920 h.p., a present total for the two stations of 10,820 h.p., with an ultimate capacity of 15,000 h.p. Storage is also under construction at several points. These developments

are intended to supply the city of Halifax and it is expected that some power will be available next August.

The Lunenburg system is designed to supply Mahone, Lunenburg, Riverport and other communities in that county. An existing plant on the Mushamush river has been taken over and extended; plans are practically completed for a new development and a third is being considered, so that the water of this river may be used three times.

Other considerable plans are in hand by the commission though not yet actually under construction, including the Sheet Harbor project with an installation of 25,000 h.p., to supply New Glasgow, Stellarton, Trenton, etc., and the industries of Pictou County, and the Bear river project for stations of 1,200 h.p. and 7,500 h.p. to supply Digby and other towns and projected industries.

Amongst industrial concerns, the Sissiboo Pulp and Paper Co., installed 2,600 h.p., and other companies some 1,700 h.p., of which part was for both industrial and utility purposes.

Altogether it may be said with respect to Nova Scotia in 1920, that it has been proved to contain a number of good-sized, conveniently located and economic sites; that the development work under construction represented over 15,000 installed h.p.; and that a good start has been made on organized and systematic development.

New Brunswick

In the province of New Brunswick, previous to 1918, there had been no systematic investigation of water-power, but in that year the New Brunswick Water Power Commission was formed, and a co-operative agreement entered into with the federal authorities similar to that entered into by the province of Nova Scotia. Since that time the policy pursued has been very similar to that in Nova Scotia.

Expert investigation showed that ample water-power resources and facilities were available and the New Brunswick Electric Power Commission (formed in 1920) has instituted the following work:

District of St. John.—For the supply of St. John and district the following three projects have been thoroughly investigated:—

Musquash river 8,000 h.p.

Lepreau river 12,000 h.p.

Magaguadavic river 15,000 h.p.

Construction work has been commenced on the Musquash plant, where three units totalling 11,000 h.p. will be installed.

Fredericton to Woodstock district.—Investigations are being made with a view to developing 8,000 h.p. on the Shogomoc river and 8,000 h.p. from two sites on the Polioke river.

North Shore district.—Investigations have been made with the object of supplying the towns in this district from the Tetagouche river, on which four developments can be made totalling 10,000 h.p. and which has considerable stor-

age available. It is expected to complete arrangements with the Bathurst Lumber Co., which has a 9,000 h.p. plant under construction, to supply power to this district until the commission's plant is installed.

Industrial developments.—The more important new work under construction in 1920 includes 2,400 h.p. by Fraser's Ltd., for pulp work; 2,000 h.p. added by the Maine and New Brunswick Power Co.; 3,000 h.p. by Canadian Cotton's Ltd.; 9,000 h.p. by the Bathurst Lumber Co.

The progress in New Brunswick during 1920 therefore consists of over 18,000 h.p. installed or under construction and a still larger amount in immediate prospect.

Prince Edward Island

The province of Prince Edward Island is included in the co-operative agreement of July 1, 1919, between the Department of the Interior and the three Maritime provinces under which all basic stream measurement and general power investigatory work is carried out by the Dominion with the co-operation of the provinces.

During 1920 new gauging stations were established and regular stream measurements were made on a number of rivers. A thorough examination of the water-power resources of the province is being carried out in a systematic manner.

Quebec

In this province the government has, through the Quebec Streams Commission, pursued for some years an enterprising and far-seeing policy by constructing storage reservoirs in the principal watersheds for the improvement of rivers, while leaving the development of power to private enterprise. The great size and successful results of the St. Maurice and St. Francois reservoirs so constructed are well known. During 1920 this policy was continued by the Quebec Streams Commission; further studies were made of the storage possibilities of Lake St. John and Lake Kenogami, investigations were carried on with a view to additional storage for the St. Anne de Beupre river and for the prevention of floods in the Beauce and other districts, and studies were also made of undeveloped water-powers, including those on the St. Maurice, St. Francois, Bell, Harricana, Manicouagan, Aux Outardes and Natashquan rivers. The commission also commenced systematic gauging on a number of rivers and, it is understood, intends to extend this to all important rivers.

Amongst the principal undertakings either completed or commenced in Quebec during the year were those of the Cedar Rapids Co., 21,600 h.p.; the Shawinigan Co., 42,000 h.p.; the Laurentide Co., 42,000 h.p.; the Lotbiniere Lumber Co., 1,680 h.p.; La Corporation d'Energie de Montmagny, 3,600 h.p.; Price Bros & Co., Chicoutimi, 17,600 h.p.; city of Riviere du Loup, 525 h.p.; Southern Canada Power Co., Drummondville, 7,000 h.p.; Canadian Consolidated Rubber Co., St. Jerome, 450 h.p. The total new power development work approximated 137,000 h.p. and a number of other large projects seem assured of commencement in the coming season.

Ontario

In pursuance of the co-operative agreement made in 1919 between the Hydro-electric Power Commission of Ontario and the Department of the Interior, the Dominion Water Power Branch is now responsible for all basic investigation respecting water-resources, while the province undertakes the detailed investigation for and construction of actual developments. Under this agreement a special bureau of the Dominion Water Power Branch has been formed to deal with this work, with headquarters at Ottawa, the stream measurement and investigatory studies have been largely extended and a very thorough inventory and analysis of de-

veloped and undeveloped water power and storage resources is in course of preparation.

Amongst the important investigatory work that falls naturally under the heading "Ontario," and to which much time and labor have been devoted during the past year, there may be mentioned the studies on the St. Lawrence river and on the regulation of the Lake of the Woods for storage purposes.

The progress in actual construction during 1920 has been very considerable.

500,000 h.p. Under Construction

The Hydro-electric Power Commission.—The installation of two new units of 20,000 h.p. each to the plant formerly owned by the Ontario Power Co., at Niagara Falls, and of a 3,500 h.p. plant at High Falls on the Mississippi river, near Perth, to supply the Rideau System, was completed. The great development at Queenston on the Niagara river has made substantial progress in spite of serious labor troubles and it is expected to commence supply in September next; this plant, with an initial installation of five 60,000 h.p. units and designed for an ultimate capacity of 540,000 h.p. is greatly needed to meet the present power shortage. The development on the Nipigon river to supply Port Arthur, Fort William, and districts, with an initial installation of 25,000 h.p. and an ultimate capacity of 75,000 h.p., is now supplying power from the first unit. At Ranney's Falls on the Trent river near Campbellford, the construction was commenced of a 10,000 h.p. plant to supply the central Ontario system. The total capacity of plants now owned by the Hydro-electric Power Commission is stated to be over 1,000,000 h.p.

Private developments.—The Big Eddy dam on Spanish river at Algoma, to create a 15,000 h.p. site for the International Nickel Co., was completed. Amongst the more important plants under construction were those of the Spruce Falls Company on the Kapuskasing river, 11,600 h.p. for a pulp mill; the Abitibi Power and Paper Co., 24,000 h.p. at Twin Falls, expected to be completed next April; plants on the Sturgeon river and Vermilion river by the Spanish River Pulp and Paper Co.; an extension of 9,000 h.p. by the Great Lakes Power Co., at Sault Ste. Marie; a plant of 4,500 h.p. by Canadian Cotton's Ltd., on the Cornwall Canal, etc.

It will thus be seen that in Ontario in 1920, there was approximately 500,000 h.p. of hydro-electric development under construction.

Manitoba

The city of Winnipeg hydro-electric plant, at Point du Bois on the Winnipeg river, consisted, at the end of 1919, of 8 units totalling 46,400 h.p., the headworks and draft tubes being completed for an additional 8 units. Early in 1920 contracts were let for extensions to the power house and for three additional units of 6,000 h.p. each, at a total cost of \$300,000 and to be completed by September 1, 1921. An additional transmission line at a cost of \$700,000 is now nearing completion. The total capacity of this plant will then be 67,400 h.p. The ultimate capacity is 16 units totalling over 100,000 h.p.

The Winnipeg Electric Railway Co., which gives a general electric light and power supply in addition to operating the street railway, has a plant on the Pinawa channel of the Winnipeg river, of which the capacity was 28,200 h.p. Recent improvements to the channel, increasing the head, and improvements to the plant have increased the maximum capacity to 37,600 h.p. This company also controls a further development under construction on the same river referred to below under the head of the Winnipeg River Power Co.

It is of interest to note that the combined efforts of the city and the Winnipeg Electric Railway Co. to supply elec-

tric power at low rates have borne marked results in the development of manufacturing industries. In number of factories and value of product, Winnipeg now ranks as the fourth manufacturing city in Canada and in the consumption of electric energy per annum per head of population (823 k.w.h.) is surpassed by few cities in the world.

It should also be noted that the power available from the Winnipeg river, exceeds 400,000 minimum 24 hr. continuous horse-power from 9 sites within 80 miles of Winnipeg, sufficient to meet all requirements for many years to come.

The Winnipeg River Power Co.—This company has commenced construction on a site at Lac du Bonnet on the Winnipeg River designed for an initial development of 56,000 h.p. and an ultimate capacity of 168,000 h.p.

The Manitoba Power Commission.—This commission, created by "The Electrical Power Transmission Act" of 1912, was formed for the purpose of distributing electric energy throughout the province and it was authorized to either purchase or generate power for the supply of any community to which it was economically feasible. The intention was, not to confine operations to water-power, but, where it was more advisable, to supply fuel power to groups of communities linked up to separate systems and to so design each such system that it might eventually become a link in the general provincial system.

Networking the Province With Power

The commission immediately undertook the supply of power to Portage-la-Prairie, 56 miles from Winnipeg, the power to be purchased in bulk from the hydro-electric plant of the city of Winnipeg, transmitted at 66,000 volts by the commission and delivered in bulk to Portage-la-Prairie.

Since that date the operations of the commission have developed with considerable rapidity along broad but conservative lines. Power was turned on to the Portage-la-Prairie line on August 16, 1920, and in the meantime the matter of supplying other municipalities in central and southern Manitoba was investigated and in a number of cases undertaken.

During the year the construction of transmission lines was commenced to the municipalities of Roland, Carman, Morden, Oakville, Winkler, Manitou and Gladstone, involving a transmission network of some 175 miles and investigations were also carried on with a view to supplying Emerson, Oakville, Rollin, Minnedosa, Virden and other municipalities that had petitioned for a supply.

Saskatchewan

While no actual development has occurred in Saskatchewan during the year, considerable progress has been made in organization of the large and important project to divert and elevate water from the South Saskatchewan river for supply to Moose Jaw, Regina, and other cities and towns throughout the dry belt of South Saskatchewan.

The Reclamation Service and the Dominion Water-Power Branch made an exhaustive investigation of this project in 1913 and showed that it might involve the ultimate diversion of 100,000,000 gallons per day, the provision of a power plant of 12,000 h.p., to pump the whole amount 300 feet to the height of land near the river, and for a comprehensive scheme, an expenditure of about \$20,000,000. The Saskatchewan Water Commission, created to deal with this matter, submitted a report to the provincial legislature early in 1916, stating that the matter was one of extreme importance, but owing to war conditions, further steps were not taken at that time.

In 1919, Regina, Moose Jaw and other municipalities commenced a strong agitation for action to be taken and an Act was passed to create the Saskatchewan Water Supply Advisory Council, to which Major Macpherson, chairman of

the Local Government Board, was appointed as chairman. The provincial government, the three transcontinental railways, the cities of Regina and Moose Jaw and some 16 or more smaller municipalities are now actively co-operating in furthering the development of this project.

Alberta

No developments have taken place in the province of Alberta during 1920, but the future possibilities are large and promising. The Peace, Athabasca and Slave rivers in the north possess a number of excellent power sites and the apparently imminent mineral developments in that region will probably lead to early development of some of these water powers for which applications have already been received. Investigations are being made with a view to increasing the storage for the Bow River developments and also with respect to power projects in the Spray Lake district.

British Columbia

In British Columbia also the basic investigatory work is carried out by the Dominion Water-Power Branch under a co-operative agreement with the Provincial Water Rights Branch, in force since 1913, and in view of the large amount of data and length of period these investigations cover, a comprehensive summary and analysis of the water power resources of the province was commenced in 1920.

While these resources, estimated at 3,000,000 h.p., include many accessible and favorable sites, the actual construction work in 1920 was in comparatively small units for individual mines and other purposes. Plans are, however, well advanced for a number of large developments, and amongst these may be mentioned that of the Bridge River Power Co., at Seton Lake, for an initial development of 50,000 h.p., with an ultimate capacity with storage of 360,000 h.p.

An outstanding feature of the year in water-power history was the acquisition by the British Columbia Electric Railway Company of the Western Power Company of Canada, and its 39,000 h.p. plant at Stave Falls; this is stated to have brought the total investment of the company in B. C. to \$65,000,000.

Yukon and Northwest Territories

During the past year the Dominion Water-Power Branch took over the administration of the water-powers in the Yukon Territory formerly administered by the Mining Lands and Yukon Branch. The development of the mining industry is almost entirely dependent upon the development of water power and during the year a hurried reconnaissance inspection and preliminary estimates were made of the available power resources in the Mayo district. The Yukon and Northwest Territories are well supplied with water-power and important applications have been received for their development. It is intended to carry out more detailed investigation this season.

Provincial Government Operation

A reference was made at the commencement of this article to the widespread movement in most of the water-power countries of the world, under which the respective governments are either themselves undertaking, or directly assisting to finance, hydro-electric developments. It is of interest to observe that in Canada there are now four of the provinces in which the provincial governments are directly undertaking the work of development and transmission, i.e., Nova Scotia, New Brunswick, Ontario and Manitoba.

Uniformity of Investigation

No review of recent progress in water-power work throughout the Dominion would be complete without a brief reference to the progress that has been made in the important matter of securing uniformity in methods of in-

vestigation and in recording and making available the resulting information. It is well known that in the past this work has been split up between the Dominion Government and a number of the provincial governments, with a resulting lack of uniformity in method and of difficulty in readily locating the information made available. The Dominion water power authorities have been working steadily towards the realization of uniformity for a number of years and Dominion-wide uniformity in hydrometric investigation is now nearly complete. The present position is as follows:

A co-operative agreement between the provincial government and the Department of the Interior, under which the stream measurement and basic investigatory work is carried out by the Dominion, was entered into with British Columbia in 1913; with Nova Scotia in 1914; with New Brunswick in 1918; and with Ontario and Prince Edward Island in 1919. In the provinces of Manitoba, Saskatchewan and Alberta, the Dominion government administers the water-powers but in Saskatchewan and Alberta, the hydrometric survey operations were carried on by the Reclamation Service; in 1920 the whole of this work was transferred to the Dominion Water Power Branch. This last step, therefore, makes the investigatory work uniform throughout the Dominion except as regards Quebec, and while no formal agreement has been made in this case, effective relations have been established between the Quebec Streams Commission and the Branch which secure a free exchange of data and a co-operative analysis of the water resources of the province.

Information Readily Available

These co-operative agreements have resulted, not only in uniformity of methods of investigation and reduction of duplication of work, but also in the establishment of a definite organization by which information on water power matters from all parts of the Dominion is now collected, co-ordinated and recorded at one central bureau, i.e., at the head office of the Dominion Water Power Branch at Ottawa, where all such information is dealt with under the water resources inventory system; this organization, which has now been in operation for some time, has as its objective that all the available information respecting the water-power and allied resources of any river, area or district throughout the Dominion shall be immediately producible, in digested form, to any person interested in the development of these resources.

New Water-power Regulations

Much work was also done during the past year by the Department of the Interior on the preparation of the new water power regulations that are to be issued under the Dominion Water Power Act, 1919. For this purpose an exhaustive study has been made of the regulations of all the principal water-power countries throughout the world, every clause has been discussed by conferences of the technical, legal and administrative members of the staff, and a complete redraft of the conclusions reached has been completed.

General Summary

Summing up the foregoing review of progress in 1920, the following seem to be the outstanding features:—

The total development work completed or under construction in 1920 represented approximately 650,000 h.p. of installed capacity.

The provinces of Nova Scotia and New Brunswick entered on an active policy of provincial government development of their water-power resources.

The province of Ontario still leads in magnitude of development work under construction.

Great activity was shown in organized general hydrometric investigation to meet future requirements and in the

investigation and planning of further considerable developments.

The total developed hydro-electric power in the Dominion now stands at 2,460,000 h.p. Taking the population at 9,000,000 (estimate tabled in the House of Commons, April 6, 1920), the development per 1,000 of population is 274 h.p., a figure far ahead of the United States and ahead of any other country in the world except Norway.

Dominion Engineering Works' Report

In the first annual report of the Dominion Engineering Works, Limited, it is stated that there has been installed a large proportion of the additional plant required for the manufacture of water turbines of all capacities, including the largest possible to transport. Work on some of these turbines is now in process, contracts having been entered into for: 2 turbines for the Laurentide Power Co., 20,000 h.p. each; 2 turbines for the Montreal Light, Heat & Power Consolidated (Cedars), 13,000 h.p. each; 1 turbine for the Montreal Light, Heat & Power Consolidated (Cedars) 1,500 h.p.; 1 turbine for the Shawinigan Water & Power Co., 41,000 h.p.; and 4 turbines for the Spruce Falls Company, 2,900 h.p. each. The Cedar Rapids wheels are duplicates of those already installed and were until last year the largest dimension wheels that had been built. The Shawinigan wheel will be the largest wheel of this type in existence. The business entered up to the 31st December, including that taken over from the Dominion Engineering & Machinery Company, amounted to \$3,400,000 approximately distributed: Paper-making machinery, \$1,700,000; hydraulic machinery, \$1,650,000; and foundry sales, \$56,000.

Returns to Japan for General Electric

Mr. J. R. Geary, manager in Japan for the General Electric Company, with headquarters at Yokohama, was a recent visitor in Vancouver, spending some days while waiting for the sailing of the Empress of Russia. Mr. Geary is returning to Yokohama after a business and pleasure trip to the United States. Having spent many years in Japan, he is intimate with conditions there and incidentally has perhaps been instrumental, while in America, in assisting to smooth out some of the difficulties in the proposed U. S.-Japan Treaty. All that the business men of Japan wish, stated Mr. Geary, is an early adjustment of relations, for that will go a long way to restoring better commercial conditions and facilitating trade between the two countries. Mr. Geary is one of the few citizens of the U. S. resident in Japan, on whom the Japanese emperor has conferred the Order of the Rising Sun.

Shawinigan Company Donates Medal

The Shawinigan Water and Power Company, through Mr. Julian C. Smith, has donated \$100 to be used to provide medals in the event of any successful resuscitations from electric shock by the prone pressure method. The Canadian Electrical Association have also undertaken to appropriate sufficient money to supplement this donation so as to continue the issuance of this medal. The conditions under which the medal will be presented have not been definitely decided but will be made known at an early date.

The Crouse-Hinds Company of Canada are distributing a folder on conductors, calling attention to the fact that the newest types of conductors can be substituted for the old types wherever this is found desirable.

Regina Adds New Turbo-Generator

General Description of Construction Features and Operating Characteristics

By E. W. BULL

Superintendent Light & Power Department, Regina

A 5,000 kw. turbo-generator has recently been installed in the city of Regina's No. 2 plant, commencing operation on November 9th, 1920. The unit is a General Electric Curtis five stage 3,600 r.p.m. of latest design having a maximum rating of 6,250 kilowatts at unity power-factor.

The turbine is designed for 200 lbs. pressure gauge and 100 degree F. superheat and a vacuum of 28 in. referred to 30 in. barometer and on test with lower steam pressure of 180 lbs. gauge and vacuum $\frac{1}{2}$ in. away from barometer the steam consumption has proven as shown on Fig. No. 1. This shows that at 4,000 kw. load the steam consumption is 52,600 lbs. per hour or 13.15 lbs. per kilowatt hours. The consumptions at 2,000 and 1,000 kw. are also shown which are consistent and point to a no-load steam consumption of just under 6,000 lbs. per hour.

The turbine exhausts into a 7,450 sq. ft. Westinghouse condenser fitted with Leblanc air pump and condensate pump all direct connected to and driven by 40 h.p. motor at 700 r.p.m. This condenser receives its circulating water from a central circulating plant consisting of two 24 in. 12,500 gallons per min. Mather and Platt vertical shaft centrifugal pumps running at 265 r.p.m. and one 14 in. 5,000 gallons per min. Gwyn horizontal centrifugal pump running at 430 r.p.m. These pumps are all direct connected to and driven by motors. The large pumps are driven by 110 h.p., G. E. motors, and the 14 in. pump by 40 h.p. Westinghouse motor.

Operating conditions are favorable and with circulating water at prevailing temperature of 40 degrees (in winter) a vacuum within $\frac{1}{2}$ in. of barometer is regularly maintained with the small circulating pump operating alone.

The turbo-generator is an A T B, 6,250 kv.a., 3,600 r.p.m., 2,300 volt, and is fitted with temperature coils for indicating the hottest temperature points of generator.

The generator is connected to regular switchboard in plant (which is arranged for six generators and feeders with duplicate bus bars) through duplicate oil circuit breakers fitted with overload and reverse power relays.

Exciting current is from regular exciters of plant which are controlled by Tirrill voltage regulators.

The five-stage Curtis turbine consists of five wheels, the first wheel having a blade pitch diameter of 35 inches and the remaining four wheels having a blade pitch diameter of 51 inches, the length of blades increasing from a length of 1 in. on second wheel to a length of $9\frac{1}{8}$ inches on last wheel.

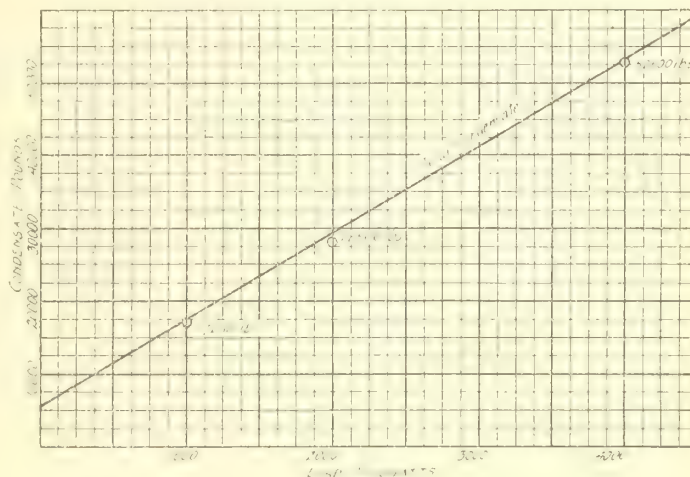
Shaft glands are steam pocked, the leakage from high pressure gland being tapped off from a point where pressure is above atmospheric pressure and led to low pressure gland by a large pipe passing through the turbine exhaust chamber. An unloading valve is fitted by which any excess steam from high pressure gland (other than the amount needed for the low pressure gland) is passed to the last two stages of machine.

The governing is done by progressive opening and closing steam valves admitting steam at full boiler pressure to more or less nozzles which act on the double row wheel of first stage. The valves are controlled by a cam shaft which receives its motion from an hydraulic plunger operated by the regular oil pressure of machine which is maintained at 70 lbs.

Oil pressure for machine is maintained by the regular gear type oil pump, direct driven by worm from turbine spindle or by a small turbine driven gear pump which is of the vertical shaft type, the whole auxiliary being a complete unit and hangs from top of oil reservoir with the gear pump submerged.

The generator has a direct connected exciter, but in the machine installed only overhung collector rings were provided. The field of the generator is solid, the winding being in radial slots with non-magnetic metal retaining wedges.

The shield packing where the shaft passes through the end bells of the generator is especially designed to prevent the suction of fans carrying oil vapors into generator. This



Total condensate curve showing results from three tests on new Machine, Regina

packing is of a modified labyrinth type and air from the discharge side of generator fans is led down to the centre of this packing, this making a flow of air outward; or, in other words, this gland is air-packed. The bearing ends are also fitted with a similar connection and are supplied with air from generator fans to prevent oil vapors being forced out of bearings along shaft where it is difficult to handle and usually is drawn into any revolving parts of machine such as collector rings. With this arrangement fitted to bearings air is actually forced into bearing shells from the ends and is taken care of by a liberal vent pipe.

The coal consumption per kilowatt hour that may be obtained from a machine of this type, operating on a load curve as shown on graphic wattmeters, and in connection with a modern boiler plant, is shown by plant records for October, November and December of 1919, when the original machine carried all of plant load. The records show a coal consumption as follows:

Oct. average load on machine, 35.1%—coal per kw. hr., 1.97
Nov. average load on machine, 39.6%—coal per kw. hr., 2.07
Dec. average load on machine, 41.6%—coal per kw. hr., 2.03

The coal consumed was Western Bituminous of about 12,400 B. T. U. per pound for October and a mixture of Western Bituminous and Saskatchewan Lignite of approximately 11,000 B.T.U. per pound for November and December.

Hydro-Electric Unit Operated From City Water Main

Unique Installation at Port Alberni, B.C., Where High Pressure and Large Pipe Capacity Permitted Water Wheel Attachment, Operating Civic Lighting Plant

By J. B. HOLDCROFT
Consulting Engineer, Victoria, B.C.

IN 1912, the town of Port Alberni, British Columbia, received its charter of incorporation and in common with most other towns at that time, anticipated a very much more rapid growth than was actually realized, the war and general business conditions combining to hold the population practically at a dead level for some years, while at the present time the town's growth is of an entirely normal character without any of the boom elements characterizing the previous period. Immediately following incorporation the town proceeded to equip itself with the essential conveniences of a water-supply system and an electric light generating station.

The water-supply station was built on a scale of permanence, the supply being taken from China Creek, 7 miles distant, and a main capable of maintaining a flow of water sufficient for a population of 20,000 people was installed. The first five miles of the main is of 16 inch wood-stave pipe. At the end of the 16 inch main is a 12 inch Crane pressure reducer, followed by $1\frac{1}{2}$ miles of 12 inch welded steel pipe, with a second pressure reducer about midway of its length. The size again changes, at the head of the main street of the town, to 10 inch steel, continuing to the end of this street at tide level, and serving the various laterals. A third pressure reducer is installed on this line, making the final pressure in the lower portion of the town usually about 160 lbs. per square inch under present conditions of consumption—a rather excessive working pressure for a town supply system.

The Existing Lighting Plant

The lighting system, on the other hand, was essentially of a temporary nature, for the reason that at the time of its construction it was confidently expected that certain large water powers in the vicinity would be developed within a short time, and cheap power be available to any extent. A temporary power house was therefore built and a Canadian General Electric 125 kv.a. generator installed, direct connected, through a flexible coupling, to a Diesel engine of Swedish manufacture.

This engine has been running since its installation, taking the lighting load of Port Alberni, and also of Alberni, the "Old Town," situated 2 miles north. The total load amounts to an average of 60 kilowatts, running up to a peak of about 80 kilowatts, the high average being due to the

fact that the plant only runs during the hours of darkness. During the winter-time the starting hour is about 3.30 p.m. and shut-down at 8.30 a.m. No auxiliary plant having ever been installed, considerable credit reflects upon the operating staff for having been able to keep the engine and plant generally running satisfactorily, as it has never been possible to undertake a thorough overhaul. Anyone who has even had to operate a Diesel engine will appreciate what is involved in this. Within the last two years, however, signs have been accumulating to show the necessity of giving the engine some assistance, and during 1920 the writer's firm was engaged to devise means of driving the generator by water-power.

City Water Main to Supply Waterwheel

The proposal was to take water from the city water main, described above, and therewith drive a waterwheel to be installed in the existing power house. On the surface this appeared to be a very simple project and before it was taken in hand by the present engineers, numerous proposals had been made, ranging from the use of a 6-inch lateral nearby as a source of supply, to the building of an entirely independent power house at China Creek itself, seven miles away. On careful examination, however, economic considerations narrowed the proposal down to the installation of a wheel in the present power-house, and attention was centered upon the best and most economical location for the supply main or penstock, together with a careful study of the possibilities of the existing main. An outline study was also made of the present use of water in the town, and an estimate was made of the probable amount of the minimum flow of the stream which occurs, as a rule, in September.

Very little is known of the watershed of China Creek and no records of rainfall or stream flow are available. This is very generally the case with small watersheds in the West, and the best that can be done, in cases where the project in hand is not large enough to warrant the cost of extensive surveys, is to make the estimate by comparison with similar watersheds having a like climate. Comparison in this case was made somewhat easier by the fact that a rainfall gauging station exists in the Alberni district a few miles from China Creek. Without going fully into the details of the calculation it may be said that by this means the minimum flow was calculated to be about 4 cubic feet per second, and

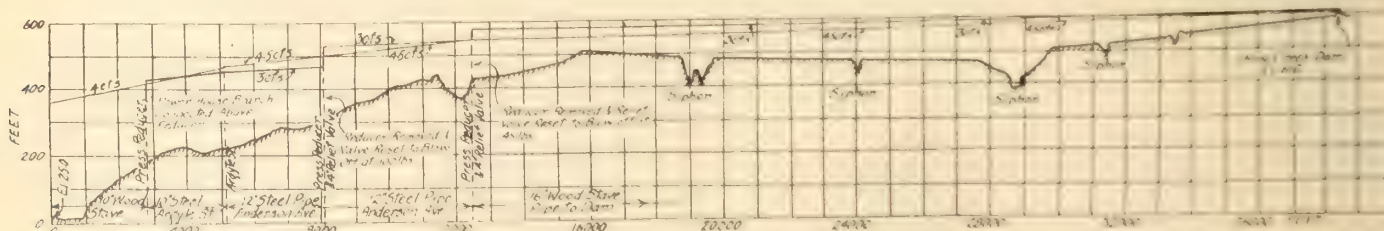


Fig 1 Profile of pipe line showing hydraulic gradients under old and new conditions. The effective head is 333 feet

that this proved to be a conservative estimate when compared with the observed lowest flow during the dry season of 1920. This is, of course, not a very satisfactory method from the designer's point of view but is frequently the only thing that can be done.

Sufficient Water for Both Drinking and Power Purposes

The quantity of water required for domestic and industrial purposes was estimated at 0.5 cubic feet per second for purposes of pipe-line calculation, which is equivalent to about 540,000 gallons per day, sufficient, on a basis of 200 gallons per day per capita for all purposes, for a population of over 2,500 people—more than double the present population of Port Alberni. The "Old Town" has its own independent water supply. A study of the capacity of the existing main,

Fig. 1, besides showing the resultant hydraulic gradient under these assumed conditions, shows (by line marked 3 c.f.s.) the conditions existing at the time the survey was made, with two private waterwheels of same capacity, as well as several small ones, running off various parts of the distribution system. The total flow for all purposes at that time was about 3 cubic feet per second, and the location and effect of the Crane pressure reducers is clearly shown. It was proposed, of course, to take out all private waterwheels if the city proceeded with their scheme, and to figure only on ordinary consumption.

Two alternatives existed for a penstock after reaching the end of the 12 inch main. One was to connect at this point and install 3,700 feet of 12 inch wood-stave pipe to the

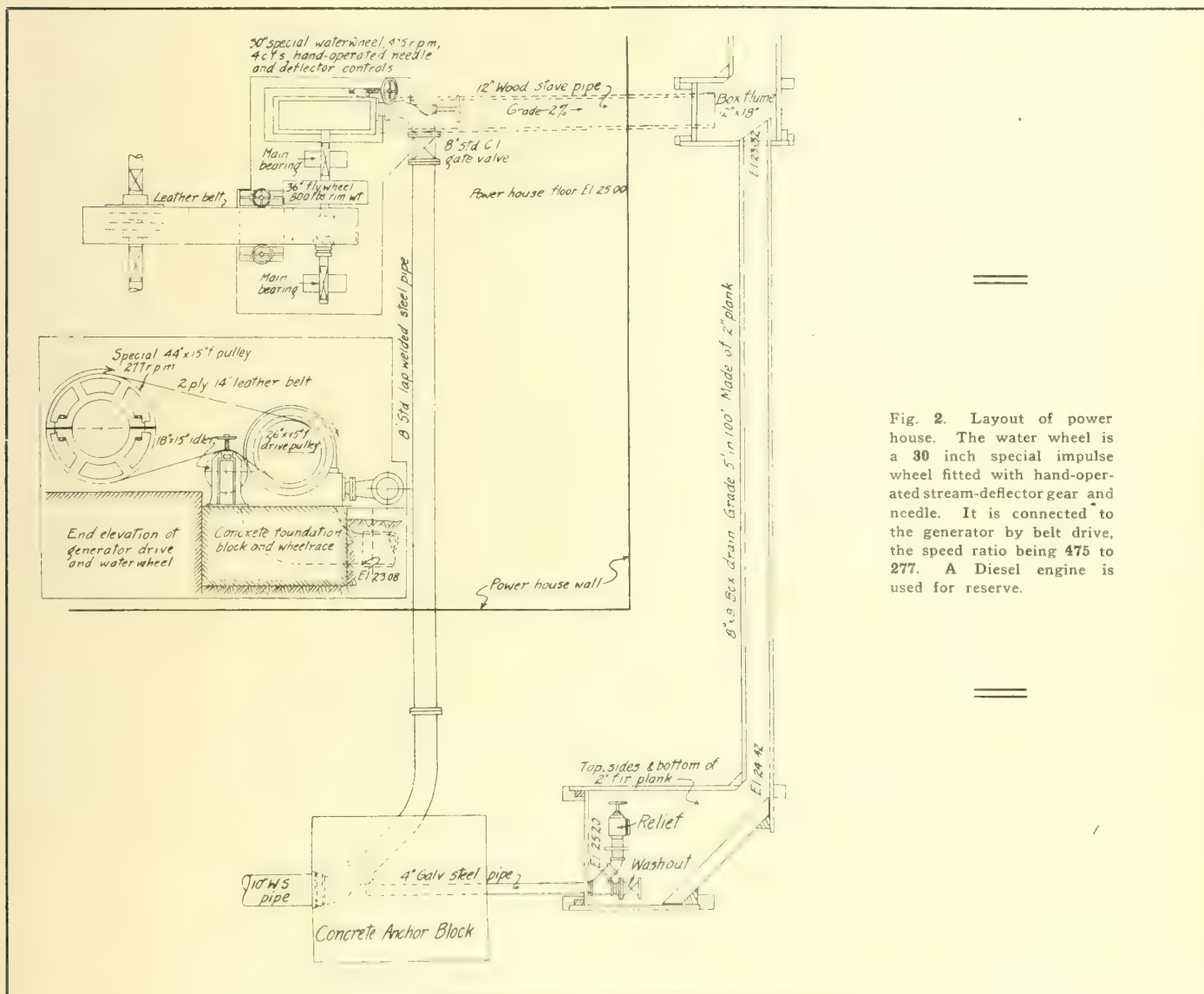


Fig. 2. Layout of power house. The water wheel is a 30 inch special impulse wheel fitted with hand-operated stream-deflector gear and needle. It is connected to the generator by belt drive, the speed ratio being 475 to 277. A Diesel engine is used for reserve.

as shown on the hydraulic profile Fig. 1, showed that a total flow of 4.5 cubic feet per second would bring down the hydraulic gradient so as to make the pressure reducers now in place unnecessary, thus making 4 c.f.s. available for power, in addition to the 0.5 c.f.s. allowed for domestic purposes. These allowances will ensure sufficient water for both services practically the year round, and should an exceptionally dry season bring the creek down to the calculated minimum, or even below this, it is most likely that the lighting service would not be interrupted as the consumption of current is naturally much less at that time of year, the plant not being large enough to contract for much commercial power load.

power-house, developing nearly 150 horse-power. The other was to connect lower down on the Argyle St. 10 in. main, install 2,600 feet of 10 in. wood-stave pipe to the power house as before, developing about 120 horse-power. This latter proposal was considerably less expensive than the former, both in total cost and cost per horse-power, and was finally adopted.

Rearrangement of Pressure Reducers

The question of operating or effective head raised a number of interesting problems. In the first place, the present pressure in the lower part of the town being up to 160 lbs. per square inch static, and even 100 or 110 lbs. with all



Fig. 3. 105 ft. trestle carrying pipe line over gulley, showing details of typical bent and section through stringers. The cost of this structure was only \$250.

the waterwheels, etc., running, it was obvious that the pressure could not be increased by opening up the reducers to gain head for the new waterwheel. Also it was feared that the present main might be endangered if pressures were much increased, higher up, so that it was decided to use the full quantity of water available, viz., 4 c.f.s., for power development and thus bring down the hydraulic gradient to approximately its original position, but with the two upper pressure reducers entirely removed, 4 in. pressure relief valves being installed at the locations of these reducers to guard against the effects of a sudden shut-down and to relieve excessive pressure at any point on the main. Connection would then be made above the third pressure reducer on Argyle St., leaving this reducer in place to control the town supply, which is nearly all taken off below that point. By this means it is hoped to somewhat reduce the town pressures from those now experienced and at the same time obtain the most possible power from the compound main without endangering it or even appreciably altering its conditions of pressure.

The elevation of the dam being 610 feet, and that of the power-house 25 feet above sea level, the total head on the main at the power-house is 585 feet, of which, for the reasons given above, 252 feet is lost in friction head, etc., leaving an effective head of 333 feet. Using 4 second-feet of water at 80 per cent. efficiency, this head represents an available power of 121 horse-power, which will be sufficient to carry the lighting plant load for some time to come at the present rate of increase.

Detailed Design

Wood-stave pipe was selected for the supply main or penstocks. The pipe selected is the wire-wound, factory-made type, being easier to install and less troublesome under high head as regards leakages. The pipe used is to be of three grades, designed respectively for 250 feet, 300 feet, and 350 feet heads, with a safety factor of 4. A 10 in. gate valve is located at the junction with the steel main, and a $\frac{3}{4}$ in. Eclipse air valve is to be tapped in to the cast iron bend below the gate valve, so as to avoid air binding when it becomes necessary to empty the main. The pipe is to be laid wholly in excavation, with the exception of a length of 110 feet supported on a trestle, some details of which are given in fig. 3. This trestle was designed to combine the greatest economy of construction with the requisite strength, and contains only a little over 2,000 feet board measure of lumber. It will cost complete about \$250.00, and is 105 feet long.

Two pipe-line anchorages are required. The first is located near the junction with the steel main, at a right-angle bend, and is quite small. The second is located at the power-house, at a point where the pipe makes another 90 deg. bend to connect with the waterwheel, and consists of a solid concrete block embedding the 45 deg. cast-iron reducing bend, and a portion of the 8 in. wrought steel bend. A heel outlet, threaded for 4 in. pipe, is provided in the cast-iron reducer, from which a 4 in. pipe leads through the anchorage

to a washout valve (4 in.) on the centre line of the pipe, and a 4 in. relief valve, which is to be set to blow off on the pressure rising to 165 lbs. These valves are to be set in a wooden box below ground level, which is connected by an 8 in. drain to the flume which acts as a spill-way.

Waterwheel and Generator

The waterwheel to be installed is a 30 in. McKinnon special impulse wheel, fitted with hand-operated stream-deflector, needle nozzle, cast-iron lower and steel upper casing, overhung on a 3 $\frac{7}{16}$ in. shaft. The shaft runs in ring-oiling bearings on special adjustable pedestals, and a 26 in. fly-wheel of 800 lbs. rim weight is mounted on it, with a 26 in. diameter by 15 in. face driving pulley, provided with a disengaging spiral jaw clutch. The wheel will run at a normal speed of 475 r.p.m. A tachometer registering revolutions per minute will be connected to the shaft, and a pressure gauge is also being mounted, connected on the pressure side of the main 8 in. gate valve which will be installed close to the wheel.

The wheel and its bearings are to be set on a concrete

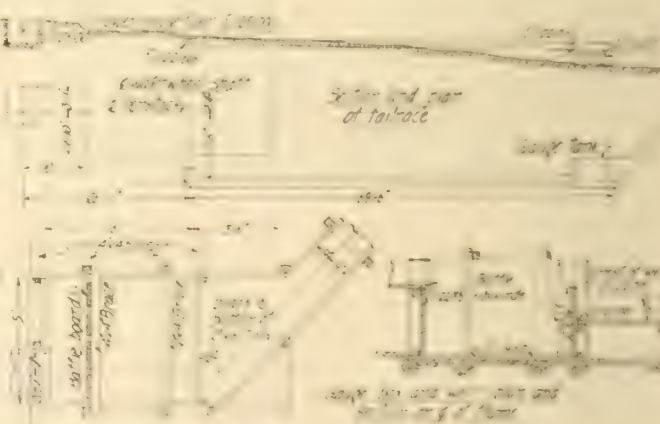


Fig. 4. General arrangement of tailrace and details of weir tank.

foundation block 5 ft. 2 in. x 9 ft. 2 $\frac{1}{2}$ in. and 3 ft. deep, which will rest upon a substratum of gravel. Details of the foundation and wheel-pit, with the general location of the other parts mentioned, are shown in fig. 2. The water from the wheel-pit is to be discharged through a short length of 12 in. wood-stave pipe to a 18 in. x 12 in. wooden drain or flume, leading to a measuring tank with a weir 4 ft. 6 in. long (Fig. 4), and thence, through a continuation of the flume, a distance of 700 feet to a natural water-course.

Diesel Engine in Reserve

Connection to the generator is to be made by a 14 in. two-ply endless leather belt, the drive being at 10 ft. 5 $\frac{1}{2}$ in. centres. The generator is designed for a speed of 277 r.p.m. so that the pulley on the generator shaft will be 44 in. in diameter. It being necessary to so design this connection that the engine could still be used when required, no change

is being made in the existing coupling further than to remove the steel studs and leather links from each half, these being kept ready to replace when necessary, an operation which can be performed within an hour. A special split pulley has been designed with central hub or boss bored to fit over the generator side of the coupling, so that installation is very simple and there will be no interference with the operation of the plant during construction—a very important provision in this case.

The drive being so short, a belt-tightener operated by counterweight is being provided, the counterweight being located on the power-house wall, and connected by steel cable to the 18 in. x 15 in. idler pulley, which acts on the lower part of the belt, the driving half being at the top.

Installation Will Save Money

The outstanding feature of the design, as regards the details, is the attempt to secure a construction which, while sound in design and efficient in operation, will yet be the least expensive possible, consistent with good engineering practice. The main object of the installation, apart from the need for a stand-by plant in case of break-down, is to assist in reducing the fuel bills chargeable to the Diesel engine, which amount to about \$2,500.00 per year at present prices. This, it is expected, the plant now under construction will do, with the engine remaining as a stand-by, but it stands to reason that expensive permanent construction would be out of the question, as no actual increase of power is being provided. It is thought, however, that eventually a second generator may be installed to be driven by the waterwheel, and the two sets run together, this providing a substantial increase of power. In any case a comparatively very short period of operation as now designed would not merely justify the cost of construction, which is estimated at \$13,000.00, but will actually pay for the work undertaken in saving of fuel oil, to say nothing of the alarming shortage of oil now being experienced, with consequent mounting prices.

Mr. Holmes Tells How to Make a "White Elephant" Pay Dividends

An interesting letter comes from A. F. Holmes, town engineer of Strasbourg, Sask., telling briefly how he turned a deficit of \$1,400 a year in his little plant into a surplus of \$900. Strasbourg has a municipal producer plant comprising a 50 h.p. gas engine which is belted to a 37 kv.a., 3 phase, 60 cycle, 2,300 volt generator. Mr. Holmes reduced the consumption of coal from 130 tons to 80 tons, and in the following interesting letter tells how it was accomplished:

Strasbourg, Sask., March 1, 1921.

Editor Electrical News:—

When I took over the management of this plant about four years ago, they called it a "White Elephant."

How I got it on a paying basis:

The coal consumed at that time was about 130 tons per year. I have cut this down to less than 80 tons. This is done by the way I fire the producer. All literature I could get on the subject always advised filling the producer full of coal and make gas. That way it took from 360 to 600 lbs. of coal to start with. I found that 100 lbs. was plenty to start the first fire and then I added on it as it was needed. This is not a lazy man's job to fire a producer in this way as it takes a lot of poking from the top. It should be poked down every 60 to 80 lbs of coal and poked until the poker won't drop through it anywhere. By firing this way I reduced the cost of coal per kw.h. from 8 to 3¼c. By adding on 15% more consumers we changed from a loss of about \$1,400.00 per year to a profit of about \$900.00, with

an increase in wages, rendered necessary by the war, of \$720 per year—and the elephant died.

Then re street lamps:

This system consists of a series circuit of 49-100 c.p lamps, constant current. They did not give the light I thought they should. I found that by painting the reflectors with white enamel that I increased the light on the ground at the lamp and also the radius of its rays. Paint and brush to paint them cost less than two dollars and not taking my thought about it, the public say that I improved the light at least 30%.

I find that when a residence is being wired it is very hard to explain to the owner and get his consent to put in the proper outlets, switches, etc. They all look at the cost of installing them and not the convenience of having, after it is finished.

Yours very truly,

A. F. Holmes, Town Engineer.

Northern Electric Engineering Society

On March 7th the Northern Electric Engineering Society held its seventh regular meeting in the lunch room of the Shearer Street Building, Montreal. Mr. J. D. Hathaway, the vice-president and general superintendent of the Northern Electric Co., Ltd., gave a short address on "The Functions of the General Manufacturing Department," outlining the activities of the clerical, production, industrial relations, plant services and maintenance, inspection, technical, operating, and installation branches. Mr. J. S. Cameron, the assistant-superintendent of the company, followed with an address on "Production," dealing with the handling of a customer's order from the time it was received, to the delivery of the finished product. In this connection he mentioned the anticipation of requirements and the need for adequate planning of the work, taking into consideration the load on the manufacturing department, the stock carried, and the tracing of the order through the various branches of the plant. Co-operation between all departments was essential to secure efficiency.

Montreal Electrical Co-operative Luncheon

At the Montreal Electrical Co-operative Luncheon, held on March 9th, Mr. F. G. Webber, Montreal manager, Bell Telephone Co., was called upon by the chairman, Mr. W. H. Winter, to give an address. Mr. Webber, in responding, mentioned some of the difficulties which the Bell Telephone Co. had to face in connection with the coming May move in Montreal. According to Mr. Webber, it was impossible to plan ahead in order to adequately carry out the moving of telephones, owing to the shortage in facilities, the apathy of the public, and the impossibility of doing the work in the short time specified. The whole problem, the speaker, said, was a regular nightmare in the telephone business. At the conclusion of the speech, the Luncheon discussed the question of daylight saving, and the vote taken was overwhelmingly in support of the adoption of a daylight saving bill. Out of town members were Messrs. G. T. Manson, Oxbury; A. J. Duggan, Hamilton; A. P. Broadhead, Granby.

Obituary

Mr. J. M. Campbell, for many years connected with the Canadian General Electric Company in Toronto, and later manager of the Alberta Portland Cement Co., Calgary, recently died in California.

The New Brunswick Telephone Company are planning to expend \$300,000 in extensions and improvements to their system in Chatham, Newcastle, Bathurst, Campbellton and Sussex, N.B.

Canadian General Electric Co. Report Record Year's Business

The Canadian General Electric Company, as shown by their 1920 annual report just submitted, has had one of the most successful years in its history. The gross profits for the year were \$2,213,731, and the net profits, after allowing for depreciation of plant and equipment, and interest on borrowed capital, were \$1,356,689. After payment of a 10 per cent. disbursement on the common stock, and 7 per cent. on the preferred, the surplus for the year was \$342,575. Adding to this amount undivided profits carried forward of \$436,097 a profit and loss credit balance of \$778,672 is shown. In addition, there was already a reserve account of \$5,000,000, so that the total surplus is now close to the \$6,000,000 mark. The report stated that in view of the splendid earnings in the recent past, it was proposed to submit to the shareholders a proposition whereby part of the accumulated surplus may be distributed to the common stockholders in the form of a 20 per cent. stock dividend.

The Canadian electric industry will learn with regret of Senator Nicholls' announcement to retire from the position of president and general manager. Speaking to the shareholders in this connection at the annual meeting, Senator Nicholls spoke as follows:

"Since I organized a syndicate thirty-three years ago, for the purpose of investigating the possibilities of the electrical industry as a field for investment, I have maintained a policy of personal control and direction of all details of the business,

great and prosperous Canadian industry, and they have expressed the desire that I accept the position of Chairman of the Board of Directors, in which position I will be able to continue to keep in touch with the affairs of the company, and my services will be available for assistance and advice when required."

It has since been announced that, in view of Senator Nicholls' retirement from the active management of the



Senator Frederick Nicholls who becomes chairman of the Board of Directors

company, for the success of which, over a period of thirty-three years, he has been so directly responsible, the directors voted him an honorarium in the form of 2,400 shares of the common stock of the company.

Due to the Senator's retirement, certain other changes were necessary in the personnel of the organization. Mr. A. E. Dymont, who has been vice-president and chairman of the board, has been elected president, and Mr. J. J. Ashworth, who has been assistant general manager and secretary, and also a director of the company, assumes the important position of general manager. Mr. J. A. Bremner, for many years comptroller of the company, becomes assistant general manager.



Mr. J. J. Ashworth, the new general manager of the Canadian General Electric Company.

large and small. The capital of the original syndicate, from which our present company sprung, was \$10,000, whereas our assets to-day are over \$31,000,000. This remarkable growth necessitated a corresponding increase in responsibilities, and I have concluded that it is not only fair to myself to ask for a measure of relief, but also none the less fair to the interests of the shareholders that younger men should succeed me and carry on. During my long period of service I have been fortunate in maintaining the respect and confidence of your directors with whom it has been my privilege to be associated in our mutual efforts towards building up a

Canadian Engineering Standards' Report

The Canadian Engineering Standards Association has recently published its second report, entitled, "Standard Equipment for Single Phase Distribution Transformers." The requirements outlined in the pamphlet have been drawn up primarily for the use of manufacturers and purchasers and are intended to express the recognized Canadian practice as to the standard sizes and construction of pole or service type transformers of which the secondaries are to be directly connected to the consumers' circuits. The question of distribution transformers was originally taken up by the C. E. S. A. sub-committee on transformers at the request of the H. E. P. C. of Ontario, difficulty having been experienced owing to lack of uniformity in Canadian practice regarding standard sizes, polarity, number and percentage of taps and other important points.

The report is not intended to include such portions of the transformer specifications as are already sufficiently provided for in Canada by the very general adherence to such standardization rules as those of the A.I.E.E., nor does it cover certain points in regard to which general agreement does not at present seem possible.

Montreal Electrical Co-operative Luncheon

At the Montreal Electrical Co-operative Luncheon held on March 16th, Father B. L. Conway, New York, gave a very forceful address on Capital and Labor, in which he described the extremes of individualism and socialism in the industrial world. To combat these evils, and to prevent pauperism, he advocated that a proper system of justice should be established. Mr. W. H. Winter occupied the chair. The out-of-town guests included Messrs. A. Pritzker and R. L. Hornidge of Toronto, F. R. Goldsmith of Stratford, M. Donnelly of Ottawa, G. J. Duggan of Georgetown, J. R. Boswell of New York, N. L. Rea of Schenectady, and H. E. Saunders of London, Eng.

Public Utilities Surtax Not Effective

The clause in the Administrative Commission of Montreal Bill, whereby it was proposed to make the five per cent. surtax on public utilities companies permanently effective has been killed, after a discussion before the Private Bills Committee at Quebec. The tax was imposed in the first instance in 1918, when the city of Montreal was in serious financial difficulties, and the public utilities had then been appealed to to aid the city. The agreement was that the tax was to be effective for three years only.

The companies represented at Quebec were the Montreal Light, Heat & Power Co., the Bell Telephone Co., the Montreal Public Service Corporation and the G. N. W. Telegraph Co.

Purchasing Agents' Association

Mr. L. C. Haskell, of the Southern Canada Power Company, has been nominated as vice-president of the Purchasing Agents' Association of Montreal. Mr. D. M. d'Albenas, of the Northern Electric Company, has been nominated for a position on the executive.

The city of Winnipeg, Man., recently called for tenders for 50,000 lbs. of weatherproof, insulated copper cable.

Vancouver Electric Club

Ignorance and antagonism on the part of the public towards public utilities create conditions that prevent good service, according to Mr. J. Lightbody, publicity agent of the British Columbia Electric Railway Company, who delivered an interesting address on public utility relation to the public before members of the Vancouver Electric Club at the regular weekly luncheon in the Hotel Vancouver, March 25. Mr. Lightbody appealed to the entire electrical industry for co-operation in an educational campaign, declaring that anything that affected the central station adversely would react unfavorably upon the industry as a whole. He said, "You, as part of the electrical industry, should readily see that the prosperity of the whole depends on the degree to which the central station prospers, for without electrical power the demand for electrical apparatus is nil. No community with poor electric light and power service can hope to attract new manufacturing for the industries of to-day are more and more depending upon electricity for power."

Canadian Branch English Electric Company

It is announced that the English Electric Company, one of the three large manufacturers of electrical machinery and equipment in the British Empire, are extending their operations into Canada. A Canadian branch has been formed with Mr. Gordon F. Perry, the president of the National Iron Corporation, Ltd., as chairman of the Canadian Board. It is expected that manufacturing will be started in Canada at an early date. Mr. Perry is in England at the present time arranging the details.

Contracts Awarded to Boving Company

Contract has been awarded by the Hydro-electric Power Commission of Ontario to the Boving Hydraulic & Engineering Co., Ltd., of Lindsay, Ont., for two 5,000 h.p. vertical shaft, single-runner, hydraulic turbines for the Ranney Falls development on the Trent Canal near Campbellford, Ont.

Prominent Faces in Electrical Co-operative Association of the Province of Quebec



F. J. Parsons, Manager
McDonald & Willson, Montreal, Vice
President



K. B. Thornton, General Manager
Montreal Public Service Corporation
President



N. Simoneau,
Simoneau Electric Contracting Company
Vice President

The Electrical Contractor

Overhead and Profit, in Electrical Business

An Interesting Letter and Information Table from Lush-Burke Electric Company

Winnipeg, Canada

Editor, Electrical News:—

We are submitting some copy with this letter dealing with overhead and profits in the electrical business, which ought to make interesting reading for some of the subscribers of the Electrical News.

We have noticed several times of late where firms have juggled with these figures something like this:—They thought their overhead was 15 per cent., so they added 25 per cent. to the cost of their goods and made 10 per. cent profit. We hope a few of these wizards of "efficiency" will cut these figures out and use them to find out what they really are doing with that small but very important factor in business called **profits**. We hope the figures on what constitutes an overhead make interesting reading. They taught us something and have helped to put our business on a more sound financial basis. Our average overhead for last year by this method was 24 1/3 per cent., and we are not spendthrifts.

Wishing you every success, we are,

Very truly yours,

Lush-Burke Electric, Ltd.,

Per J. E. S. Leane.

Items to be Considered When Figuring a Job

A—Material.

B—Labor.

C—Overhead. Items as follows:—

1. Shop rent.
2. Figuring and supervising job.
3. Collections.
 - (a) Time making same.
 - (b) Bad accounts.
4. Carfare and cartage.
 - (a) Interest and depreciation on auto.
 - (b) Auto maintenance.
5. Phone rentals.
6. Shop and office maintenance.
 - (a) Office help.
 - (b) Heat, light, water.
 - (c) Postage.
 - (d) Printing, stationery and supplies.
7. Interest charges.
 - (a) Interest on money invested in stock.
 - (b) Interest on money in outstanding accounts.
8. Depreciation charges.
 - (a) Depreciation in value due to reduction in prices.
 - (b) Depreciation due to breakage, wear and tear, etc.
9. Insurance Charges.
 - (a) Fire insurance.
 - (b) Workmen's compensation.
 - (c) Liability insurance.
10. Taxes.
 - (a) Income tax.
 - (b) Business tax.

TABLE FOR FIGURING NET PROFITS

(1) If your cost of doing business figured on gross sales is represented by one of the percentages in the upper horizontal column,

(2) and you add to your cost of labor and materials one of the percentages in the left hand vertical column,	PER CENT	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	25	5	4	3	2	1	0	1 x	2 x	3 x	4 x	5 x	6 x	7 x	8 x	9 x	10 x
	33.3	10	9	8	7	6	5	4	3	2	1	0	1 x	2 x	3 x	4 x	5 x
	40	13.6	12.6	11.6	10.6	9.6	8.6	7.6	6.6	5.6	4.6	3.6	3.6	1.6	0.6	.4 x	1.4 x
	50	18.3	17.3	16.3	15.3	14.3	13.3	12.3	11.3	10.3	9.3	8.3	7.3	6.3	5.3	4.3	3.3
	60	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	9.5	8.5	7.5
	75	27.9	26.9	25.9	24.9	23.9	22.9	21.9	20.9	19.9	18.9	17.9	16.9	15.9	14.9	13.9	12.9
	100	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20

(3) your percentage of net profit on gross sales is represented by the figure at the junction of the two columns. (x) indicates a loss.

EXPLANATION:—If your cost of doing business is 21% of your gross sales and you add 33-1/3% of the cost of labor and materials, your net profit is 4% on sales. If your cost of doing business is 28% and you add 33-1/3% to cost of labor and materials, you suffer a 3% loss. If your cost of doing business is the average for electrical contractors, namely 23%, and you desire a 10% profit, it will be necessary to add 50% to the cost of material and labor.

Suggestions and Recommendations
by Paul C. Burrill* at Milwaukee

Financing An Electrical Contractor's Business

Divides Itself Naturally into Three Departments: Finance, Sales, Service

An electrical contracting business falls naturally into three departments: Finance, Sales, and Service. Most electrical contractors have begun their business with department number three. They have felt that they understood electrical construction, and were able to give customers service, and on this have attempted to build up a business.

After some years of dabbling in business in this manner, they realize that sales is an important end of the business, and either organize a sales department, or devote a certain part of their own time and energies to this particular end of their business. Then we have a business two-thirds complete with both departments distinctly recognized, but we still have little or no attention paid to finance. It is only after a business has grown with distinct sales and operating departments to such proportions that the question of finance is forced upon him, that a contractor realizes that this is a vital factor in his business.

In the beginning he usually carries these matters in his head or on the back of an envelope stuck on a nail near the window, and it is only when he realizes how much he is losing by these methods, that the contractor gives careful and distinct attention to the first department of his business, finance.

Let us consider some of the big businesses of the country and see what attention they pay to finance. Look at a railroad. Does the organization of a railroad begin with its conductors and switchmen, does it begin with its ticket sellers and solicitors, or does it begin in Wall Street with its promoters and bankers?

Consider a manufacturing business. Is the works department the first one organized, with its superintendents and workmen, is it the sales department with the sales manager and commercial travellers, or is it Department One? Is not the business first conceived by the general manager, who then consults the bankers and the bond market in planning his business? The more our business grows, the sounder it gets and the better we develop it, the more attention we are going to pay to finance, that is, getting and keeping the money on which the entire business is based.

Now, this department of a business has its sub-divisions. The two natural sub-divisions are getting the money and keeping it. Keeping the money is a matter of bookkeeping. I don't believe it is expected that I should discuss what sort of books a contractor should keep. This will depend entirely upon the nature of his business. This subject includes cost accounting, auditing, paying bills, and invoicing.

The subject I wish to outline here is the other part—getting the money, and the first question that naturally arises is, how much is required? I propose to set up a model business and work from this. If this business is double yours, divide my figure by two. If this business is half of yours, multiply this by two and make a comparison with your own affairs. When I am finished I should like to have you be frank in criticising these figures, and out of the discussion I hope we can get a feeling of whether or not our business is properly provided for.

I propose to consider a business doing a monthly volume of \$10,000. This is at least a two or three man business. I mean by that, that it must have two or three responsible, active, partners or managers, as one cannot carry the responsibility for a business of this size without delegating considerable authority to responsible subordinates.

I imagine this business will have an office force of five or six people outside of two or three who carry the chief burden, and I am figuring that this is a diversified business such as our associations, our trade magazines, and our jobbers and manufacturers have been encouraging us to develop during the past few years.

This business has a fair proportion of construction work, employs 10 to 20 electricians, conducts a store, canvasses for appliances, and serves industrial plants with supplies. It is not a manufacturing business and it is not a jobbing or distributing business.

I am using this figure because it is a round number, easy to remember and work from, and I think most closely approximates the average of our membership, at least the ideal towards which our businesses point. It is the basis on which our company operated for quite a number of years. This business amounts to \$120,000 a year or approximately \$1,000,000 in eight years.

Let us try to approximate the amount of capital used in this business. We will not assume that the contractor owns the building. This is not ordinary business practice. We recognize that real estate is entirely distinct from commercial business, and we have rented a building under a fairly long lease. This lease should not be so long nor the rent so high as to make the aggregate rental payments run into too considerable a proportion of the total net assets of the business.

We will say the lease should run from three to five years, and the rental should be in the neighborhood of 1 per cent. of the amount of business done. The analysis of costs of an electrical contractor furnished by our National Association says that the rental, light, heat, and power, of a business shall approximate 4 per cent. of the volume.

Equipment and Merchandise

Excluding the building, the first item of investment to be covered is furniture, fixtures, tools, automobiles, and other equipment. This will vary a great deal according to the particular nature of the business, and its particular location in the city in which it is carried on. Thus a downtown business with emphasis on merchandise sales, would run heavier in fixtures and appliances than a business devoted more to construction work, and located in an industrial neighborhood where plainer equipment would suffice. Let us provide for this business two or three automobiles at say \$3,000, and let us provide office furniture and other equipment of \$7,000.

The second thing to be provided is merchandise. The amount and volume of this merchandise is going to vary with business conditions. It is going to be necessary to carry more in times such as we have had during the past three years when we could not depend upon our jobbers and manufacturers to furnish us with material immediately. In nor-

* Secretary, Norman Andrew Electric Co.

mal times when these organizations are performing their functions properly, our stock can be reduced.

A contractor should never attempt to speculate in material, buying a year's supply because he thinks the price is going to go up, or because the salesman induces him with a little longer discount. If he attempts either of these he is invading a field entirely distinct from construction and merchandising. He is becoming in a small way a jobber and an investor. He should not attempt this until he has a definite fund for such a purpose, and can consider that with a certain proportion of his capital he is speculating.

The main question in providing a certain amount of merchandise is turnover. We have heard a good deal of this in the past few months, and the merchant who can get a turnover in 30 days is going to be more successful than the merchant who takes 180. I do not admit that turnover can increase materially the amount of business for each man, and intensive sales or advertising or a change in buying policy alone is not going to enable him to double his volume of billing, and thus cut his turnover in two. I think rather that business as fixing turnover is a question of reducing stock.

I believe all of us will find our business to be between the 30 day basis and the 180 day basis, but I believe most of us are nearer to taking six months to turn our stock than we are to taking one. I believe we should expect to get our business on a 60 day basis, but in providing funds to operate a new business a good plan is to estimate your requirements and then double.

We won't go quite that far in this case, but we will assume that our contractor-dealer is going to turn his stock over in 90 days or three months. This means, if his sales are \$10,000 a month, and half of his total cost is merchandise, which I think is a close approximation, that he will have an inventory of \$15,000. This is the figure I wish to use in this connection. I invite your particular attention to criticism of this figure. I believe we can do better. Will you please analyze your business and see if your inventory of merchandise on hand does not run close to one and one-half times your monthly billing?

The third item of investment is office overhead, and that is the amount of work which has been completed and has not yet been billed. The contractors' capital is tied up, the customer has not had notice of his obligations, and naturally has not paid them. I doubt if many contractors can keep their average under a half month's work. In other words, on the 15th of this month did you have billed all the business you did last year? I am going to use this 15 days as the basis of delay in billing this, and add to our investment for this item \$5,000.

The fourth item of investment is accounts receivable. This does not include accounts which have been settled by notes, but merely the open accounts on the books. Again, the nature of a business is a factor of the amount we are going to use. If we have a greater number of time payment contracts the proportion is going to be increased. It is not safe to figure on less than 60 days' business being on the books. In our own organization we have for the past year held this figure between 45 and 55 days, but to be safe I am going to use 60 days' business here or \$20,000.

Investment Covered

Now we have covered the biggest part of our investment. We have a total of \$47,000. There are going to be other small items such as insurance paid in advance, and rent where our payments average 15 days in advance, but all of these are insignificant compared to the four items above, so you can safely admit that business should be operated on a net investment of \$50,000 or five months' turnover. This is close to the average I have seen in our own business since I have been connected with it. I think we have bettered it most of the time, and most of you can better it by careful atten-

tion to turnover or collections, which you will see from what I have said are the most important factors in financing a business.

I will not discuss any further how turnovers or collections can be improved, but these items represent \$15,000 and \$20,000 respectively, or \$35,000 out of the total \$50,000. This is 70 per cent. of the total. A man should see the whole of this \$50,000 before he plans his business. There is a little which can be distributed, and which is a natural deduction. Most of our merchandise can be discounted if we settle at regular dates, so that the ten day period can in general be extended to 20 days. Twenty days' merchandise purchases is \$3,000, which the wholesaler will be glad to carry.

Your payroll ledger will, if you settle on Tuesday night for the previous week's work, amount to an average of four days or about \$500, which your employees are carrying. These two amounts should hardly be used to reduce the amount of working capital, but should rather be left in a bank balance. They should certainly be so left if we expect to operate this business on a much smaller capital than we indicated above, and borrow the balance from the bank.

Where to Get Money

We have tried to answer the question of how much money should be provided. Now we will address ourselves to the other question of where to get it. It is needless to say that.

The man who reaches this point in his business and has analyzed his investment carefully, has a problem before him. We will say that he has \$20,000. Is it safe for him to embark on such a scheme as this, or business of this size? Not unless he has the full confidence of his banker and his jobber. He has not a sufficient margin on which to operate and under these conditions he should go frankly to the banker and show what his net assets are, and consult with him on such matters as he can, telling him at the same time how much he expects the jobber to carry. He should make the same sort of an arrangement with his jobbers.

If he expects to buy on longer time and not discount his bills he should have definite arrangements to this effect with all from whom he buys, otherwise the seller will expect to have his bills discounted and the contractor's credit rating is going to suffer.

The ideal way, of course, is to have on hand the full \$50,000, to operate this business. With 50 per cent. of this amount the contractor is going to be in difficulties all the time. To meet his bills he must ask his creditors to wait 60 days. He must borrow a larger amount than the banks really want to carry. In case he is operating on this basis he will probably make some such arrangement as this: He will borrow from the bank \$10,000 either on demand notes or on 90 day notes maturing from time to time, and he will settle with his principal jobber for a certain line of credit and ask him to carry his notes for from 60 to 90 days, settling his invoice, however, when due.

The trade acceptance is the politest way of arranging this credit. In this way the jobber will cover an additional \$15,000 of his deficit. These figures are both more than the banker and the jobber will willingly grant, but these should be the only two persons asked to carry the balance that the contractor does not carry himself. If the contractor has \$35,000 and can reduce these figures to \$7,000 or \$8,000 each, he is going to get a much more ready response from both.

I have not discussed such operations as selling preferred stock and bonds on the open market, as a contracting business rarely develops to this extent, and any funds obtained in this way can be considered a part of the contractor's own original investment.

This completes my discussion on the subject assigned, but there are three closely related subjects which I can hardly avoid bringing before you while I am on the floor.

They are the questions of investing employees, of time payment contracts, and of overhead.

Some contractors have made arrangements with certain of their employees to take stock in their organization. This has two advantages. The first is that it increases the net assets of the organization and decreases the amount of money which it is necessary to ask the banker and the jobber to carry, providing the owner is not in a position to finance his business alone. The second advantage is probably greater, and that is, the employee feels an interest in the business and will assist in stopping those leaks which the owner himself cannot look after.

Now as to time payment sales. All we have to say is, that if we go deeply into this business alone, the accounts receivable item is going to be increased from 60 to probably 180 days, depending upon the length of time we permit our contracts to run. If we sell a washer at \$185, getting \$15 down and \$10 a month, it will take the customer 18 months to pay out, and on an average his accounts are going to be owing nine months.

Our smaller sales can probably be completed in a shorter time, but experience shows that even a ten months' vacuum cleaner contract usually lags a month before it is closed up, and we cannot thus expect an average on this business of less than six months. If the model \$10,000 monthly business were all appliances sold on contract, it would mean that accounts receivable would approximate \$60,000 and the total investment \$90,000. This means a much larger initial investment, or a much longer line of credit.

I do not believe we will find it pays to turn these accounts over to the banks who make it their principal business to carry them, such as the Morris Plan Bank. These people will only loan us in the neighborhood of 70 per cent. of the value of these accounts and tie us up pretty strongly with bonds and other conditions, and make us finally responsible for the collection in the end. If we figure right down to a sharp point they are getting between 18 and 23 per cent. for the use of their money, and no business man can afford to pay this rate. In this respect the department stores are getting the best of us. If a contractor sets out to do a big appliance business it is going to require so much money to carry his accounts that he soon becomes involved, but the department stores with net assets of a million or more can easily go to the bank and borrow on their general account \$100,000 or \$200,000, sell stocks, or raise the money in other ways, and can carry this business without feeling it.

Dealer Must Be Cautious

A dealer going into this business should have his eyes open, and realize that every time he sells a \$157.50 washer on which the customer pays \$15 down, he must pay the jobber \$110 for that washer and the salesman who sold it \$15; that is, he himself must invest \$125. He gets \$15 back and is \$110 in the hole. He naturally thinks the only way to make this up is to go out and sell another washer, but when these charges go through to the bookkeeper, this gentleman reports that the house is another \$110 in the hole, and this merry circle keeps on until, whether he knows it or not, the contractor begins to get tired of the entire business.

The big department stores do not feel this so long as it is only a small feature of their business, but the dealer feels it at once when he begins to make this the big end of his affairs. One manufacturer tells us that careful analysis shows it costs \$5 to carry a vacuum cleaner account over ten months. This figure covers interest, bookkeeping, postage, printing, and was arrived at after spending more than \$1,000 for expert accounting service. I wonder how long we are going to continue to give this service away for \$2.50 and carry time payments with a 5 per cent. addition.

There is one important feature to be considered in connection with overhead expense, namely, that the volume of your business should be worked out closely in connection with your organization and quarters. If you have too big an organization and too large a building and cannot keep it filled up with business, your overhead expense is going to be too high.

As you increase the volume of business certain fixed expenses are going to remain stationary, and your percentage of overhead is going to decrease until you reach the point where your business just nicely fills your building and loads your organization. When you attempt, however, to do still more business with the same building and the same personnel, your percentage of overhead is going to go up again because your clerks are going to get into each other's way, your salesmen are going to interfere with each other, your construction crew is going to stand around waiting for material, and you are going to have untold leaks that are not accounted for.

There is a certain happy relief between the volume of business and the size of your organization which must be maintained in order to get the most efficient results. It does not pay to bite off too much business if you haven't the right people to handle it, any more than it pays to have too large an organization, and not enough business to carry the overhead.

Two Important Parts

Going back again to my original subject, I would say that of the three departments of an electrical contracting business—Finance, Sales, and Service—the first has had the least attention paid to it, but is the most important of all.

This subject has two parts, keeping track of your money and providing the funds. Funds should be provided for between four and five times the monthly volume of business it is expected to handle. This is based on the four principal items of investment, which are equipment, merchandise, work in progress, and accounts receivable.

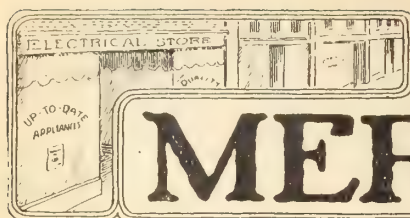
A contractor should have in sight approximately two-thirds of the amount of money he is going to use and will be able to go to his banker and jobber to get the other third. If he provides only 50 per cent. he is stringing his credit too far, and if his assets are less than 50 per cent. of his total investment he must look for difficulties. See to it that a certain amount of net assets or investment is provided and the business is not developed beyond what its investment would justify.

Amendment to National Electrical Code

The Canadian Underwriters' Electrical Inspection Bureau have made the following amendment to the 1920 edition of the National Electric Code. This amendment will be in force beginning April 1, 1921:

"The inner end of the service conduit must extend into a metal service box containing the service cutout and main disconnecting switch, located inside the building at the nearest accessible point to the place where the service wires enter the building. The service box must be of approved design, arranged to be operated from the outside of the enclosure, equipped with a locking or sealing device, and shall be so marked as to indicate, without opening the enclosure whether the switch is in the "on" or "off" position.

"All knife switches with their fuses, except when mounted on switchboards and panel boards, must be enclosed in metal boxes of approved design. The metal box must be so arranged as to permit the operation of the switch from the outside of the enclosure, and must be so marked as to indicate without opening the enclosure whether the switch is in the "on" or "off" position."



BETTER MERCHANDISING



Electrical Industry Lacks Vision —Business Conditions Are a State of Mind

One of the most useful addresses presented to the Hoover dealers at their recent Hamilton conference was that delivered by Mr. A. W. Fischer, director of sales of the U. S. company, North Canton, Ohio. Mr. Fischer urged that business conditions depend on mass psychology. If millions of people have confidence and will spend freely, business is good. If the reverse is true, it is bad. Business conditions are precipitated by confidence or lack of confidence on the part of the public. When once set in motion, such conditions run their course. This is the operation of economic laws. The cycles through which trade conditions pass are respectively, improvement, prosperity, liquidation and re-adjustment. When improvement comes, conditions will continue to get better until we reach another era of prosperity. Basic conditions which precipitate the operation of economic laws depend on crops, international conditions, financial conditions, political situations, etc., etc.

Newspapers help make bad conditions because they dwell on temporary conditions and abnormal situations. Canada has eight and a half million people, of which two million one hundred thousand are workers. During normal times 4 per cent. out of eight million five hundred thousand workers are out of employment. When there is 12 per cent. of unemployment in Canada we have chaos and unrest; such conditions would mean a quarter of a million workers out of employment.

Temporary unemployment has been caused by temporary curtailment of manufacturers. Since the first of the year, most manufacturers have again resumed operations. Road building and the housing situation will aid many to national wealth, give employment to many people out of work and help make better business conditions this year.

Before the war, merchandising was done on turn-over basis, but during the war it was impossible to do a large volume of business with a small amount of capital. Turning stocks frequently was discontinued for the reason that prices were ascending and merchandise scarce; consequently, it became advantageous to hoard merchandise. Now in the post-war period, with declining prices, merchandise is not purchased for storage but for immediate turn-over at a smaller profit. The type of merchandising in vogue during the war made a "lost art" of selling and made purchasing agents of dealers.

During the war markets became hungry because we refrained from buying any commodities in order to curtail raw material and labor. When the armistice was signed this long repressed demand for many commodities was satisfied by overfeeding. In other words, we absorbed more than we did during normal conditions. The market was then in a dyspeptic state and must slowly readjust itself.

In this new re-adjustment, manufacturers, salesmen and dealers all have a definite responsibility. The dealer must become a better merchant. He must insist on courtesy from his help. He must adopt suggestive selling. He must get

rid of high-priced merchandise. He must study and practice turn-over. He must deal in fast selling commodities, which means advertised commodities. He must make it easy for his customer to do business with him. He must school his selling help. His help must know more about the commodity than the purchaser. The biggest individual responsibility which the merchant has is to re-acquire the confidence of his customers which has been lost in the past two years.

The salesman must help to unload his dealer. He must find new additional dealers. He must study turn-over and merchandising. He must be satisfied to take small orders and see his dealers more frequently. He must urge dealers to buy when they cannot be forced. He must talk, think and believe optimism. He must work more hours. He must adjust himself to conditions of 1913. Above all, he must sell on a scientific basis.

The manufacturer must revim his organization and analyze his business from every angle. He must advertise. He must rebuild his sales organization. He must help his dealers with every worthy co-operative effort. He must again make honest merchandise, because honesty in raw materials and in labor was in a great many instances impossible during the war period. He must go back to service basis and expect big turn-over in his organization. The keynote of all business this year is hard work, man power and optimism.

West Kootenay L. & P. Extensions

It is expected that the engineers of the West Kootenay Light & Power Company will make a survey of the Okanagan Valley to ascertain the cost of extending the power lines of that company from Penticton to Vernon. The wires are now strung from Bonnington Falls to Allenby, and should the scheme be found to be workable, power lines would be constructed from this point up the valley, supplying Penticton, Summerland, Naramata, Kelowna, Vernon and Armstrong.

The new 1,500 horsepower electric plant at Parry Sound, Ont., was almost completely wrecked recently owing to one of the wing dams giving away. A new channel was blasted out in an endeavor to divert the torrent from the power house. Mr. Geo. Murray, superintendent, had a narrow escape when the flood struck the plant.

A movement has been started to organize the municipalities that obtain electric power from the Severn, Eugenia and Wasdell Falls developments into a Northern Municipal Electrical Association. An organization meeting is to be held shortly and the towns served by these plants have been asked to send representatives.

At a meeting of the Toronto Hydro Power Commission recently held in Toronto, reports showing that the power supply would be ample during the spring and summer were read. On the strength of this assurance it was decided to light up the big sign in front of the Hydro building on Yonge Street. This sign has not been in use since the shortage became acute a couple of years ago.

Are Present Margins on Electrical Appliances Sufficient to Yield Profit?

Most Dealers State That the Margin is Not Sufficient on a Number of Appliances—Here's a Logical Discussion of the Subject

By L. E. TROTTER *

Before Ohio State Association Meeting

The object of this paper is to try to briefly give you a few facts on the question of "Are the Present Margins on Appliances Profitable?" The general answer to this question is "No," and this answer is based on the usual gross profit to dealers of 25 per cent.

It is true that there are several conditions which have a direct bearing on the amount of profit that a dealer must secure to allow him a reasonable net margin, and inasmuch as you are quite familiar with most of these conditions we are going to just touch lightly on this phase of the question.

The item of overhead has probably the greatest direct bearing on the amount of profit necessary to allow a dealer to do a profitable business on a set margin. Another very important point is the amount of turnover which can be made on a certain appliance. It is obvious that if the turnover is sufficient and the overhead small a commodity can be handled on a much smaller margin, but statistics show us that an average condition among the dealers who sell and service larger appliances should have a discount of from 30 to 35 per cent., and it is only under the most favorable conditions that he can make a satisfactory showing at the gross margin of profit.

As a specific and extremely unusual case we have in mind a retail store which did a total business on large motor appliances amounting to approximately \$87,000, with a gross profit of approximately \$32,000, or 37 per cent. The operating expense of this retail store aggregated for this same period of time approximately \$29,000, which you will note again is 33 1/3 per cent. of the total sales billed, or in other words, this leaves a net profit of \$3,000, or approximately 3.4 per cent.

As stated, this is an unusual condition, but we are citing it to you merely to substantiate the statement made above that from 30 to 35 per cent. seems to us to be the minimum amount of margin on which a good live advertising dealer should be operating.

We have in mind also a dealer who is doing a monthly business between \$5,500 and \$6,000, and is not making any money on discounts of 25 per cent. on washing machines and ironers and 33 per cent. on vacuum cleaners. This dealer's store is in an excellent location on the main street of a city having approximately 70,000 inhabitants. A good portion of his sales are made in the store. No commission is paid on store sales. The solicitors who make a house to house canvass are paid at the rate of 10 per cent. on washing and ironing machine sales and 20 per cent. on vacuum cleaner sales. Although a 20 per cent. commission is paid on vacuum cleaner sales as compared to 10 per cent. on washers and ironers, it is believed that this is possible in view of the fact that there are seldom any delivery charges on cleaners, whereas the delivery charges on washers and ironers amount to a considerable sum.

Changed Conditions Now

What we are particularly interested in right now is: How are the dealers going to handle appliances in the period facing us which we all believe is not going to be as easy sailing

as we have had for the past two or three years? Dealers to be successful in merchandising the various commodities must beyond doubt maintain a selling force that will get the necessary results and it is true that a selling force cannot be maintained at a small expense. Salesmen are expensive and good salesmen naturally demand good salaries, and it is obvious that it is impossible for this condition to be met unless the dealer has a margin of profit that will justify this expenditure.

We are frank in telling you that we believe in the next year or two the dealer's or merchant's overhead is going to be higher on electrical appliances than it has in the last two years, and we therefore must say that we cannot possibly see a profitable margin for the dealer unless the present conditions are changed very materially. If the jobbers in their meeting with the manufacturers are able to put enough real pep into their arguments the electrical appliance game as handled by the electrical dealers may continue to flourish, but unless this condition is brought about it seems to us that there is nothing in this line of material for the dealers to look forward to.

It has been my personal experience to have recently had an opportunity to talk to merchants in our lines of material and one particular case which is recalled, is a man who is handling stoves. When the question of discount, namely, 25 per cent., was mentioned to him as a working margin, you can believe me when I tell you that it did not take him long to make up his mind that he was not interested in the electric range proposition. He was a merchant of long experience and knew whereof he spoke.

It seems to me that the sale of electrical appliances has grown into a very deep rut and unless this condition can be changed the results as outlined above are sure to be brought about. We do not believe that it is going to be possible to correct this condition overnight. On the other hand, it is only going to be through the untiring efforts of both the jobbers and dealers that a satisfactory working condition is going to be brought about and we would like to recommend in conclusion that every dealer in this country should work hard and earnestly to show to the jobbers and manufacturers actual results which will probably do more toward bringing about the desired relief than anything else.

Is it not possible for you as a dealer to send to your jobber your actual sales conditions? Show him the amount of appliance business you have done in the past year together with the total profit and actual expense of doing the business. Do you not believe that by such a procedure you will be helping the general cause? As stated at the beginning of this paper we believe that there is only one answer to the question under discussion, "Are the Present Margins on Appliances Profitable?" and the answer is "No."

Another Example

Another working condition which happened to come to my attention was that of a dealer who employed a specialty salesman who is devoting his entire time to the sale of washing machines and ironers. And a study of this man for two weeks we found the following results:

In the two weeks' period he sold four washing machines

* Assistant Sales Manager, The General Electric Company

and two ironers at a total sale price of \$1,085. His salary and expenses figured \$25 per week plus a commission of 5 per cent. amounting to \$104.75. This you will note made an actual selling expense to the dealer of 10 per cent., and I believe that you will all agree that this salesman in the two weeks was successful.

The dealer handling this material is buying at a discount of 25 per cent. delivered to his store. This leaves a gross margin of 15 per cent. out of which he must stand the delivery of the machine to the user, the handling of the account, advertising, and whatever service is demanded.

It is true that we have gone through boom times in washing and ironing machines and vacuum cleaners and other appliances when they almost sold themselves, and with that result? Thousands of these appliances have been sold but hundreds of dealers have been made lukewarm toward the appliance business and for only one reason. Their margin of profit has not been and is not yet sufficient to take care of their normal overhead and leave them a net profit, without mentioning at all the allowance that must be made in making free repairs in the name of service, which must be given by the electrical business.

There Are Times When Expenditures Mean Economies—Salesman Makes a Discovery

"Well, how's things?"

"Quiet," replied the sales manager, stroking his chin and looking down at his desk with a thoughtful expression.

"What's the matter—business gone on the blink?" continued the drummer, as he seated himself and pulled out a fat cigar and trimmed it.

"No, not exactly," replied the sales manager. "I believe there is plenty of business, if we could only get it coming our way. There ought to be a regular avalanche, if we could only get it started; but somehow the people just won't buy," he continued in a tired voice. "They insist that prices are going to come down, and that it will pay them to wait. They keep quoting the prices at which they bought our machines before the war, and then sit back and wait."

"How long do you think that condition will last?" asked the other, as he lit his cigar and puffed vigorously.

"Oh, it's hard to say. It might last a month; it might last two months; it might last six months."

"Well, you'll just have to hang on till it breaks," replied the drummer, half humorously.

"But we've got to live in the meantime!" exclaimed the sales executive rather testily, as he drummed his fingers on the desk.

"So has the poor public," replied the drummer, crossing his legs quite unconcernedly while the manager favored him with a look of half astonishment, half scorn.

"What's that got to do with it?" he demanded.

"Everything! If you can show the housewife how she can reduce her household expenses and at the same time lessen her work and add to her comfort, she will not wait longer than it takes to get the machine into her home."

The sales manager looked puzzled, but remained silent, while the drummer continued.

"The average woman will lose more in time, labor and laundry bills during the next two months than would pay five times over for any reduction in price which may or may not occur in the next year—probably will not."

The face of the sales executive brightened a little, but he said nothing.

The drummer had laid aside his cigar, and the light of the true salesman shone in his eyes, as he leaned forward

and in earnest convincing tones drove home his point. "Furthermore," he said, "What is helping to keep prices high, but the fact that the housewife has held off buying electrical appliances? Not only that, but by holding off she has thrown many workers into idleness. The cause of the present high prices lies largely at the door of the buying public, and the buying public can remove the trouble just as they started it—by buying." Having relieved himself of this oration, the drummer picked up his cigar and assuming his position of ease, watched the blue curling smoke rise and vanish in air, while silence reigned. Even the typewriter stopped to listen, and the jaws of the stenographer lost their momentum and the gum lay limp and flattened on the end of her tongue.

The manager rose and walked to the window. "That sounds very well, but I don't believe it. Even supposing it were true, how are you going to make the dear public believe it?"

The drummer removed his cigar to speak, but another voice interrupted the silence; it was the telephone. The drummer waited.

The sales manager lifted the receiver. "Hello!"

The telephone: "Mr. Smith talking."

"Yes, Mr. Smith!"

"Say, I've got to get a washer into my house right away. My wife has taken sick. Too much work. Cost me over \$50 already for doctor's fees. I've been waiting for prices to come down, but I can't wait any longer. What's the price of your machine?"

"Two hundred and ten dollars, Mr. Smith."

"Why it was \$200 a week ago."

"Yes, I know, but with the reduced demand the cost of selling has gone up, and we can't make a better of it until the public start buying again."

"D—n," said Mr. Smith, "shoot one over to me. I've got to have it, and I'll send you my cheque on delivery," and click went the receiver.

"Well," said the sales manager, "I guess you're right."

"I guess I am," replied the drummer as he rose with a smile and reached for his hat. "Better get hold of the other Mr. Smith's before they, too, run up fifty bucks for doctor's bills," he said wisely as the door closed behind him, and the typewriter and the jaws resumed their work together.

Slow Speed Vertical Generators For Low Head Water Powers

To meet the need of the small and medium size low head water power applications, a line of low speed vertical shaft generators has been placed on the market by the Westinghouse Electric & Manufacturing Company. This line consists of 112 different kv.a. and speed ratings, ranging from a frame size having a rating of 62½ kv.a. at 300 r.p.m. to a frame size having ratings up to 1,300 kv.a. at 180 r.p.m., 100 kv.a. at 138 r.p.m., 825 kv.a. at 120 r.p.m., and 550 kv.a. at 100 r.p.m. This line of generator has been designed in its mechanical features to meet the special requirements of the combined hydraulic unit. The generator base is of such diameter as to permit a wheel pit of sufficient diameter to provide for the ready removal of the turbine runner and head cover. Each generator frame is provided with a Kingsbury thrust bearing and upper and lower guide bearings. All bearings are lubricated by a self-contained, circulating oiling system. An exciter driven pulley and idler pulley for use with a horizontal belted exciter are included with the generators. The standard generator parts are so designed that a mechanically operated friction brake can be supplied when desired. Provision is made, where unusual hydraulic or load conditions prevail making additional flywheel effect necessary, for mounting a separate flywheel on shaft coupling.

What's Wrong with the Electrical Business?

By C. D. HENDERSON

President Henderson Business Service Ltd., Brantford

Please don't all speak at once! No doubt a good many answers can be given to the above question, but in my humble opinion—gathered from actual experience in the business, plus talks with members of the Trade from Vancouver to Halifax—I believe the biggest drawback at the present time to a sound, healthy growth of the Electrical Business, is the ridiculous variation in prices. I refer particularly to prices in connection with Tenders and Time and Material Work.

There is no doubt about it, the electrical contractor is suffering from this condition both directly and indirectly. It is destroying public confidence in the contractor. It is creating an unfriendly feeling among members of the Trade. It is making it harder and costlier for jobbers and manufacturers to do business. It is stopping work or driving it into other channels, and last but not least—it is preventing those in the business from making a legitimate profit.

This is no secret. Any contractor you ask will tell you of this job or that one on which tenders varied from 10 to 50%. Only last week the writer heard of a case in which the lowest price was \$2,000 and the highest \$2,800 (and incidentally, the \$2,800 price showed a net profit of about 7½%).

There is absolutely no reason or excuse for these wide differences in prices and I believe if members of the Trade would give a little more thought to this subject, they would soon see how utterly impossible it is going to be for the present contractor-dealer to survive unless this condition is remedied. There is a chance for a 5% difference in tenders—people expect it—and it does no harm—but when it comes to 20, 30 and 50% differences, it would be a huge joke if it were not such a serious matter.

Let us analyze this thing and see if there is any possible justification for these variations.

In the first place, no matter who the contractor is—where he is situated—how clever he is—or how much money he has—every price he gives and every dollar he takes in consists of four elements: 1st, **Material**. 2nd, **Labor**. 3rd, **Overhead Expense**. 4th, **Profit**. To leave out any of these is simply financial suicide. Therefore, if there is going to be any difference between his price and that of his competitor it can only be in the proportion of one or more of these four elements. Now let us take each of these by itself and see where any differences might exist.

Material

Electrical material has become fairly well standardized both in quality, quantity and price. It is possible for a contractor to save 5%, or sometimes 10% on some items. The trouble is, he thinks he is procuring something on the side and, therefore, has it on his competitor. In most cases, however, his competitor is getting the same thing.

The writer has purchased a considerable amount of electrical material during the past few years and I do not believe, when taking everything into consideration, there is more than 5% at the outside that can be saved by one contractor over another in buying.

Labor

Generally speaking, all electricians and helpers in one city or town get about the same rate of pay. (They see to that). The only chance for a difference in this item is in

estimating the time required to do the work. It must be admitted that there is a great difference of opinion on this subject, but I believe any contractor will agree with me when I say that in 95 cases out of 100, the labor is underestimated.

Overhead Expense

Somehow or other a lot of us think that this thing Overhead is a sort of myth. We read a lot about it in the Trade Papers and listen to talks on the subject, but never seem to get an invoice for it and are apt to come to the conclusion that we don't carry it in stock and if it is having any effect on our business, we sort of imagine that Providence will take care of it for us.

I have met a few contractors who claimed in perfect sincerity and innocence that they had no overhead expense. Thank Heaven this type is nearly extinct, but there is the next grade—almost as dangerous, who will tell you his overhead expense is about 10%. There is, however, some hope for this fellow because he admits that such a thing exists and its only a question of showing him that he under-estimates by not including the proper items and thereby misleads himself.

I want to make this assertion, and if I am wrong would welcome being shown, and that is—that the average overhead expense in the electrical business is 25% on sales. In other words, for every dollar taken in, 25c must be laid aside to cover overhead expense.

It is apparent, therefore, that there is no chance for very much difference here.

Profit

There is not much use wasting time on this point. There is not the slightest danger in my mind of the average contractor adding too much profit. I would say that the minimum should be 10% on the selling price, but even if the profit was left off altogether and those tendering were satisfied to do a job for cost, this would only make a difference of about 5 to 8%.

Now, Mr. Reader, after following up this article, do you see any chance or reason for the present wide differences in prices? If I have failed to analyze this problem correctly and if my conclusions are wrong, I would appreciate being shown my errors and I believe the editor of Electrical News would also welcome your views.

Reforms can only be accomplished by constructive co-operation and my only purpose in writing this article is to try and impress on members of the Trade that this Price Condition is not a necessary evil to the business, but can be overcome if we will look facts in the face—eliminate guess work—read our Trade Papers and exchange ideas with our competitors.

I am no pessimist. To my mind no other line offers better possibilities during the next 5 years than the electric business. But if those engaged in it ever hope to reap the advantages they must discard cut-throat competition and compete with each other on Service and Quality. In the words of the poet:

Count that day Lost
Whose low descending Sun
Sees Prices Shot to Hell
And Business Laid to Fun

What is Newest in Electrical Equipment

The Air-way Electric Equipment

A number of unique features are shown in the Air-way electric cleaner, manufactured by the Air-way Electric Appliance Corporation, Toledo, Ohio, for whom the Canadian distributors are the National Electric Heating Company of Toronto. This machine is so designed that it is easy to get into the hard corners, under the radiators and such like places where dust always accumulates at an abnormal rate. For getting into these corners, the handle of the cleaner is utilized. This is possible because the handle is hollow. You simply turn an indicator arrow and the motor sucks the air through the handle, which is so small that it can be poked into the most obscure and difficult corners, cleaning out every bit of dirt. This machine is also specially designed for cleaning under beds, furniture, etc. By a simple turn of the wrist the motor may be placed at any angle to the position



The Air-way Vacuum Cleaner

shown in the figure, so that, if necessary, the sweeper will work lying flat on the floor. Another feature is the sanitary paper bag which this machine uses. Instead of using the same bag over and over again, a new bag is inserted each time. As the figure shows, the machine is very light in weight, and it is claimed that a child can carry and operate it.

The same company manufacture what is called the "Air-way Junior." This is a cleaner that is carried in the hand and is used for cleaning shelves, motor cars and many other such like purposes. The absolute ease with which it can be operated makes the Junior a particularly valuable machine.

The Air-way washing machine is also being placed on the market in the immediate future. The National Electric Heating Company will manufacture these machines in Toronto for distribution in Canada and all British possessions.

Bryant Sockets With Spartan Outlets

The Bryant Electric Company have added to their line of wiring devices, key, keyless and pull sockets with side outlet of the Spartan standard style. As will be noted from the illustration, the side outlet is of compact design and does not increase the over-all length of the socket, nor its diameter, except directly at the point where the receptacle is formed. Moreover, the receptacle part of the combination socket does not interfere with the threaded bead on the socket so that it is possible to use a shade over the lamp if desired—the shade being supported by a Uno shadeholder which screws on the bead. In these sockets the usual porcelain in-

sulation is replaced by molded insulation so that the slotted receptacle member and the socket base can be accurately assembled. Moreover, the receptacle member is not easily chipped or damaged as would be the case with porcelain. The two outlets of these sockets are in multiple connection so that when the key or pull switch is operated to control



Combination Socket and Plug Outlet

the lamp, the circuit through the receptacle and extension cord therefrom is not disturbed. Thus it would be possible to operate a fan or desk light through the side outlet without using the lamp in the socket. The brass shells of these sockets will fit any of the 45 caps and bases of the New Wrinkle interchangeable line. All three of these devices have approved ratings of 660 watts, 250 volts on each outlet—ample for heating iron or percolator service.

New Solderless Connector

W. H. Banfield & Sons, Toronto, are putting out a solderless connector which should be a great time and labor saver. The connector is in wrought steel, with fluted inner jaws of brass which, forced by a substantial screw, clutch



Views of Banfield's Solderless Connector. The view on the right is the actual size

the bare wire ends, making a perfect contact and a grip that cannot be separated. All that is necessary is to scrape off one-half inch of insulation, insert the end in the brass jaws and screw down tight. The connector has been approved by the Hydro-electric Power Commission and will be sold by jobbers throughout Canada.

Square D Installation in Bread Factory

A very neat installation has been completed in the bakery of the Lawrence Bread Company, Toronto, with a Square D combination switchboard comprising 12 switches, presenting the appearance shown in the accompanying photograph. These 12 switches control 12 motor circuits of a capacity varying from 5 to 10 h.p. each. As seen from the

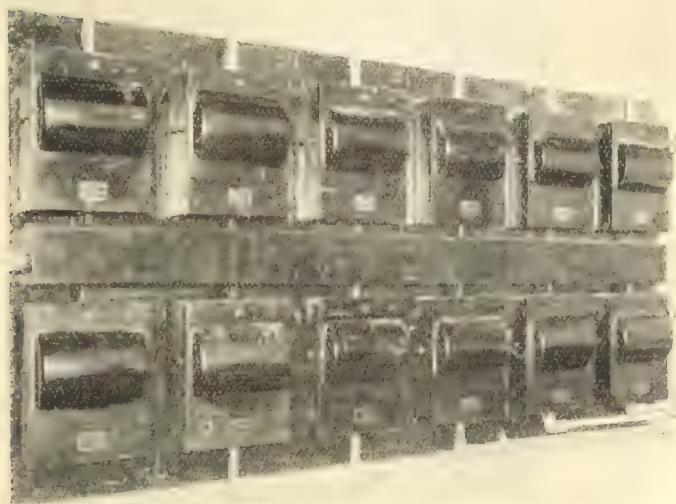
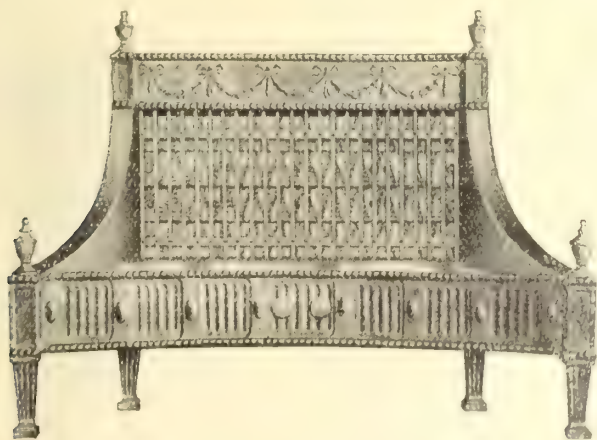


Photo of "Safety" Equipment in Large Factory

photo, this built up type of board is not only safe but also very neat and attractive in appearance. The flexibility of such an arrangement allows the electrician a practically unlimited scope in his installation. Switches may be added or removed at will by the simplest possible operation, and best of all, accidents are prevented with their consequent delays, reduced efficiency and slow-up in production.

An Attractive Open-hearth Grate

A new design of electric hearth grate, presenting a very handsome appearance either hot or cold, is being manufactured by the National Electric Heating Company, of Toronto. One of the designs is shown herewith. It will be seen that this heater is designed in the correct Adam period



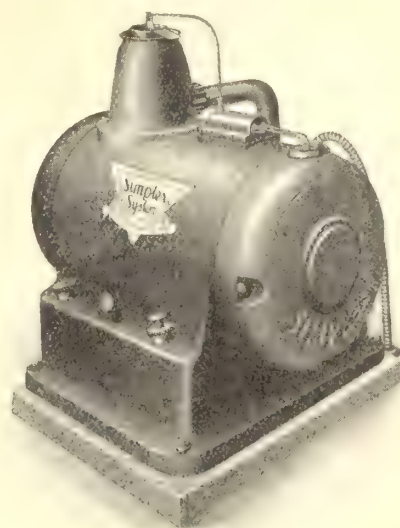
Grate Designed in Adam Period

style, and that it forms a decorative feature of distinctive quality for any well furnished room. As the cut shows, this is an open hearth type heater. Its capacity is two kilowatts, operated by two tumbler switches, each controlling 1,000 watts. This heater may be had in any of the standard finishes.

Self-Starting, Individual Light & Power Plant

The Simplex Utilities Corporation, 360 Madison Avenue, New York City, have developed a "Simplex" light and power plant which is self-starting, self-stopping and self-protecting.

The unit consists essentially of a patented two-cycle single-cylinder, air-cooled, vertical engine of high compression and high efficiency, complete with exhaust piping and muffler, automatic carburetor and high tension ignition. The



1,500 Watt Plant for Rural Light and Power

battery is of 16 cells, 32 volts and contained in glass cells. A full automatic control, operated by the specific gravity of the battery effects various electric circuit connections for starting and stopping the engine and sounding an alarm whenever any electrical or mechanical fault occurs.

It is made in one standard size, of 1,500 watts, at a standard voltage of 32, and will supply sufficient current to light 120 16 candlepower lamps, operating directly from the set. The battery, when fully charged, will maintain a total of 70 lights for four hours continuously. The size of the plant is 27 in. long, 18 in. wide and 22 in. high.

New Store in Dunnville

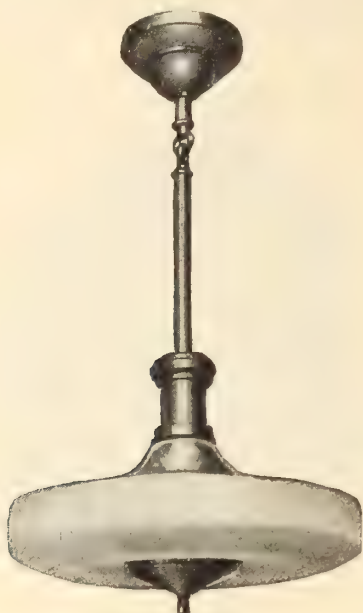
Messrs. Barrick & Wingfield on March 12th opened an electric retail store in Dunnville, Ont. Their store is very centrally located near the post office. In addition to retailing they will also carry on an electrical contracting business. Dunnville is a town of somewhere between three and four thousand population and should be able to support a splendid electric store if the citizens will but realize that electric goods should be bought in an electric store. That Messrs. Barrick & Wingfield with their experience in electrical matter will educate the townspeople along this line we have no doubt.

D. F. Streb Forms Limited Company

Mr. D. F. Streb, well-known contractor-dealer of Saskatoon, Sask., has formed his business into a limited company and has taken in as partner, Mr. A. A. Murphy, B.Sc. Mr. Murphy is a former member of Murphy & Underwood, consulting engineers of Saskatoon; he is a graduate of McGill University and before coming to Saskatoon in 1911 was with the Westinghouse company. The two names constituting the new firm represent a very strong combination, and we look confidently to see The Electric Shop, Ltd., continue the progress that has been so evident during the past few years.

Semi-Indirect Commercial Lighting Unit

The Ivanhoe-Regent Works, General Electric Co., Cleveland, Ohio, have developed a new totally enclosed semi-indirect commercial lighting unit, known as the "Keldon." It is designed for the use of hospitals, schools, and indeed, any place requiring diffused light of high intensity. The glass



globe of the unit is blown in one piece and enamelled on the sides and bottom; it is specially designed to reduce the brightness of the unit and yet throw a light of high intensity without glare. Besides being completely enclosed, the unit has a bottom cap for the removal, or replacement, of the lamp without disturbing the globe. The unit is made in both ceiling and suspension types.

Cassco General Supplies, Limited, dealers in electrical, mechanical, and railway and mill supplies, have opened an office and warehouse at 315 Craig Street West, Montreal. The office is under the management of Messrs. J. H. Allen, R. S. Stuart, C. Crook and A. C. Sheriff.

Wm. F. Kelly Starting on His Own

Mr. William F. Kelly, for the past five years Ontario district sales manager for the Canadian Tungsten Lamp Company, Ltd., and the Ontario Lantern and Lamp Company, Ltd., announces that he is opening an office of his own in Toronto on April 1st, where he will carry on a manufacturers' agency business. Mr. Kelly has been with the Canadian Tungsten Lamp Company for fifteen years, during part of



Mr. W. F. Kelly

which time he had charge of the Vancouver office. He is well and very favorably known to the trade throughout the Dominion.

One of the lines Mr. Kelly will handle is that of the Duncan Electrical Company, of Montreal, manufacturers of a number of well-known pieces of small equipment. It is his intention, however, to add other equipment of equally high quality, so that in a short time he will be able to offer the trade a complete line of quality material.

Mr. Kelly is a brother of the well-known general sales manager of the Hoover Suction Sweeper Company, Mr. Thomas F. Kelly.

Vancouver Electrical Contractors Elect New Officers



The new President, Mr. W. W. Fraser shown to the right.

The new Secretary-treasurer, Mr. J. C. Reston on the left.



Motor-Driven Equipment Used in Logging Work

Application of electric apparatus to the various processes in sawmills is widespread, but it remained for the Snoqualmie Falls Lumber Co., Snoqualmie Falls, Wash., to use it on actual logging apparatus in the forest. They have at present for this work in the woods a yarder and loader, both mounted on the same sled. The former is a Williamette Iron Works, Humboldt, three-drum yarder, having for motive power a 200 h.p. phase-wound General Electric induction motor used on a three-phase, 60-cycle, 550-volt power circuit. The loader, also built by the Williamette Iron Works, is equipped with two 75-h.p., phase-wound induction motors. The two machines each occupy half of a 60-ft. sled which renders them portable.

The power supply for the two machines is stepped up to a pressure of 13,000 volts at the mill power plant by three 250-kv.a. transformers, the transmission line running through the woods. The supply voltage is stepped down by two 250 kv.a., single-phase, 600/13,200-volt transformers at the scene of operations. The transformers are rendered mobile by being mounted on a small sled which is equipped with a disconnecting switch. This sled is set about 500 ft. from the one carrying the yarder and loader, energy being transmitted between them by a flexible armored cable laid on the ground.

Some difficulty was experienced at first in obtaining desired slow speeds on the yarder, but when this was overcome by the insertion of resistance in the rotor winding the operation became satisfactory. In 1918 the machine yarded 3,144,898 ft. of timber in 44 days, or an average of 71,470 ft. per day. In 1919, due to an increase in the transformer capacity, the average output per day was raised to 77,000 ft. The same efficiency which characterizes the operation of the electric yarder is demonstrated by the loader. In fact, the application of solenoid load brakes to the motor makes it possible to compete with a steam-driven outfit. It is

also possible by means of this braking system to do one thing which a steam outfit cannot do, namely, to hold a log suspended in midair, or in any position desired. This is made possible by the fact that when power is shut off from the motor the solenoid brake sets automatically so as to prevent any motion.

Results obtained by the electrification of the logging operations are the most convincing argument possible in favor of the electrification of the logging industry generally. Methods that increase production and cut costs are as valuable in lumbering as in any other industry and deserve thorough consideration by those interested.—Electrical Review.

The municipalities along the line of the London, Huron & Bruce Railway are to be invited to attend a conference with representatives of the city of London, Ontario, on the subject of the electrification of the line. The scheme would mean an increase in the value of farm lands and village and town property adjacent to the railway. Only recently, it is said, the Grand Trunk Railway cut the freight service on the L. H. & B. to three days a week each way, and this fact has given a strong impetus to the electrification plan launched by Philip Pocock, vice-chairman of the London & Port Stanley Railway.

The Brown Instrument Co. of Philadelphia have recently issued two very complete catalogues on Heat Recording Instruments for both High and Low Temperatures. A copy of these catalogues can be obtained through their representatives, J. D. Lachapelle & Co., 223 Notre Dame St. West, Montreal.

Applications for waterpower, proposing to generate about 5,000,000 horsepower, are to come up for consideration at the first meeting of the Federal Power Commission, at Washington, U.S.A.



The London Hydro displays are always good business getters. This view shows a booth at the last Western Fair where electrical goods were among the big attractions.



Electric Railways

Adaptability of "Safety Car" to Severest Canadian Conditions

Will Go Any Place Any Other Car Can Go, Better Service, Lower Operating Costs

By H. E. WEYMAN*
Manager Levis County Railways, Levis, Que.

The Safety Car of to-day is nothing more or less than a scientific development of a car operated by one man brought about by co-operation between expert railway operators, motor manufacturers and car builders. The idea of operating street cars with one man only is not new. In Illinois the old type of single truck car operated by one man has been in service more than twelve years, and in Sherbrooke, Que., since 1911. I can distinctly remember a man returning to Montreal from Sherbrooke about that time, who was quite indignant over his experience when boarding a car there, which he described as follows: "I stopped a car and could not get on the right end (rear end); the motorman opened the front door and shouted for me to come up front, when I arrived I only managed to get on the step when he shoved a coffee pot of a fare box in my face, saying, 'Fare, please,' and I had to get down again, get out my money and then get on and pay, after which he let me in where the seats are. I then discovered that the conductor was not asleep, but that the company did not employ them."

To-day we have some three hundred companies, large and small, using the same idea in cities up to 1,000,000 population and running on headways of as low as forty seconds under heavy traffic conditions. The progress this car has made, together with the number of converts to it, is remarkable; but perhaps it is more remarkable that there yet remains a number of railway operators who still fail to recognize and understand the fundamental principles of the car and its application and economical, money-getting possibilities, and they still serve up the excuse that their local conditions, etc., will not permit its installation. Those of us who desire full information of the car can obtain it by following up the periodicals and communicating with the various companies using the cars. I propose, however, to deal with one of the so-called local conditions argued against the Safety Car and to illustrate my remarks by slides showing the actual conditions.

Local Conditions

To enable all to grasp my company's local conditions it is necessary to give a short description of the railway system. Our line is single track with turnouts or passing points, all on narrow streets and located on one side. Our traffic is 20 per cent. city and 80 per cent. suburban, and we have three divisions all radiating from the Ferry Landing, one going west to the Quebec Bridge and two going east on the same line for three-quarters of a mile, then one turning south going Uptown. Before reaching this junction point we have some 300 feet of 13½ per cent. grade, with two curves on it,

and the main road crossing the track twice on the grade. This being a dangerous place when cars are following one another they have to wait about 400 feet from the grade until the one in front has negotiated it. The Uptown line rises 300 feet in two miles, with average grades of 6 per cent., the maximum being 11 per cent. for 1,200 feet. The system has numerous curves, some say there is 10 per cent. tangent track. In addition to this we have the most severe winter conditions to be met anywhere, including very heavy snowstorms with high winds. I might say that most of our trouble is caused by the high winds, the snow fall itself being a minor detail.

In winter the Ferry is on half-hour service and in the rush hours throws some 400 people at us each trip. To take care of this we put on extra Safeties following the regular cars, called double-headers—these turn back at about halfway on each division, leaving the regular car to run to the terminus. Formerly we operated double-truck, 40,000 lb., 140 h.p. cars and no extras, and these, of course, operated all day and ran to the terminus; we also had some single truck



Mr. H. E. Weyman

cars on our Uptown line. Naturally the double trucks were responsible for very heavy peaks on the power system besides heavy maintenance of track and equipment. With the Safeties we considerably lowered our peaks and cut everything else in half, incidentally providing better accommodation and service.

In 1916, we considered operating our car with one man but were doubtful, in those days, of success, owing to the very severe conditions to be met. We, however, decided to convert an old single truck car to one man operation having manually operated doors and steps and hand brakes. This car proved a success and as the folding doors and steps were new and never heard of before everybody wanted to ride on it. We next decided to convert a double truck car having an entrance and exit, for we thought that this would help to handle the congestion at the Ferry and the interchange point. Here we found a mistake in thinking one car can

*Before recent Ottawa Convention.

successfully all winter, handling up to one hundred and twenty-five passengers per load, we found that we were losing a lot of fares and much time through that exit door. The operator and fare box was near the controller, on the incoming side rail, and not at the division rail. In consequence, when both doors were open for in and out passengers the operator was not permitted by the crowd to close the exit allowing a number of passengers to get by without paying and, incidentally, causing much commotion and loss of time, sometimes almost a fight. We also found that with one door only, passengers waiting for others to get off would get their fare ready, whereas with both doors they would wait until they were in the car. This may sound trivial, but it counts up at congested points. We soon blocked up the exit and see no reason why such is needed with the Safety Car, especially in dense traffic, as more is lost than gained and you multiply the operator's work. It's not a two-man car, but a one-man, and the operator must have absolute control over the passengers. We converted six other cars to one-man operation, but as we were only getting 40 per cent. of the total savings which could be effected by the Safety, without counting the increased traffic which they create, together with the fact that our old equipment was on its last legs, we decided to go in for the new safety car. We probably investigated this car and its characteristics more thoroughly than most companies do, especially as we were repeatedly told by both Canadian and American railway operators that it could not operate under our conditions. Finally, we decided to stand by the principles of engineering and ordered twelve Birney cars, specially fitted up for our climatic conditions. These cars have been in operation twenty months now and prove to be equal, if not superior, under snow conditions, to the double-truck cars. Moreover, we no longer haul 140 h.p., 40,000 lb. cars, around for twenty hours per day, filled only for five or six hours per day. Instead we have a very flexible method of regulating the car capacity to meet the traffic requirements at the minimum wear and tear and expense. It also proves to be very convenient in arranging the trainmen's daily time schedule, eliminating extra hours and overtime, etc.

Unusual Climbing Ability

The climbing ability of the Safety is equal to, if not better than, the double truck and no cars have derailed on account of snow. The Safety has remarkable tractive effort, which, together with the quick acceleration, permits the car to operate better under bad rail conditions than any other car. This was demonstrated only this month when our double truck freight car and the sweeper had trouble with the wheels spinning, when the Safeties had no trouble. Some years ago we used to, more or less, permit our cars to buck the snow, with the result that our equipment was finally burnt out. After that we decided to fight the snow with snow equipment only and soon found we were much in pocket. Naturally we do the same with the Safeties, and although they have once or twice bucked the snow without trouble we do not allow it to occur if possible. We have run into snow banks reaching to the grid resistance and the warm and cold contact has buckled the grids and fenders. We have G.E. ball-bearing motors and block up the bottom ventilating ducts in winter, leaving the top ones open; this prevents snow and water in the motor. We use a Rotary Plow, which is necessary on account of the heavy drifting, narrow streets, and the track located on one side of the street. On the sidewalks we have a continuous high snow bank which gives lots of trouble and causes considerable drifting. No sidewalks are cleaned, the public using the track as the sidewalk. The winter road is about 12 feet wide with banks on both sides.

In bad snow storms or blizzards our sweepers are un-

able to even operate themselves and get snowed in; only the rotary plows are able to move and they have at times to go out to fetch the sweepers in should these have been left out a little too long, and, of course, the passenger cars have to be pulled in. It's a question of good judgment to calculate the storm and whether to pull everything in or not and decide the right moment to do so. To leave the equipment out too long results in delay in commencing operating again, owing to bad rail conditions, etc., and probably damage to the equipment. After a blizzard and shut-down we are in full operation again within five hours.

To take care of high track centres we have a motor flat car fitted with an ice cutter, which cuts down the centres and sides. We also cut the winter roads with the snow



This photo gives an idea of the snow conditions in Levis, Que.

equipment and take care of them, removing the snow, for which the municipalities pay three-quarters of the expense, we paying a quarter, which quarter we naturally are very anxious to get rid of.

Careful Inspection

Our railway system is by no means an ideal one to show what the Safety Cars can do, but their showing on the Uptown line might be of interest. From the centre of Uptown to the Ferry is three to five minutes walk, up or down the cliff, while it takes the cars fifteen minutes to arrive at the same point, which they do by a circuitous route. Well, in spite of two raises in fare to 10c. cash, and tickets 7½c. each, and no increase in the headway, although three Safeties replaced four old cars, giving a little faster schedule speed, we average 25 per cent. increase in revenue passengers. If they do this with us you can imagine what they can do in real city service—in fact have done. When we put the Safeties into operation we put in force regular inspections at 1,500 miles, special inspections 10,000 miles, when oiling and greasing are attended to, besides other work, and a yearly overhaul of everything. We also have a special accounting system, which gives us separate figures for new and old passenger equipment, snow equipment and details of the various apparatus comprised in the car. During the period of twenty months we have the following figures:—

	Safety Cars	Old Cars
	Cents per car	Cents per car
	Mile	Mile
Car body and truck .....	.873	4.08
Electrical equipment .....	.154	2.34
Air equipment .....	.133	.63
Total	1.16	7.05

The figures for the Safeties include certain expenses due to defects in the trucks, which have since been corrected by

the car builders at their expense, and we no longer have this abnormal expense. Car inspection expense is included in both instances. It is wise to see that the Safeties are properly maintained as there is additional equipment, which costs very little to maintain, but if neglected might cause considerable trouble and expense. The air equipment and compressor was supplied and installed by the Westinghouse Company and specially designed to take care of the severe cold and we have not had any trouble with frost during two winters of operation.

Now you have an outline of the history of the Safety on the Levis property and its operation has been a surprise to us. It would not be amiss to direct your attention to the fact that certain definite fundamental principles were laid down to govern the design of the Safety car by the experts engaged on it. These were a standard car which would cover all conditions, built in large numbers, reducing their cost to a minimum, providing very flexible application to the traffic conditions, light as possible, sufficiently motored to cover all conditions, operator's duties reduced to the minimum and safety in operation. The car to be designed first and the electrical equipment specially designed for such car. To-day we have a successful car, in fact its unqualified success under light, medium and heavy conditions, has led to what is perhaps an undesirable situation among railway operators, who are inclined to overlook the fundamental principles of the design and desire to alter the car to suit what they term as their local conditions or ideas. One operator wants double doors, exit and entrance, which would decrease the capacity and increase operating troubles; another wants the car larger to hold more people; another the seating changed and another the car to be wider, etc., all of which results in larger and heavier car and truck and the motors overloaded or the next size larger to be used. Each is directly in opposition to the principles embodied in the design and affects the operation of the car. The present car is operating under heavy

h.p. cars, with two men, are hauled about all day with five to twenty passengers riding for twelve hours out of eighteen. Is that economical? Just figure out the difference in a blow on the rail joint from a 40,000 lb. car and a 15,000 lb. Safety; figure the difference in the power load and peaks and figure the motor maintenance costs. Some idea of the difference in costs can be gained from the following:

	Old Motor	Safety Car Motor
Armature coils	\$40.00	\$31.00
Set of field coils	178.00	57.00
Commutator	60.00	43.00
Armature complete	260.00	200.00
Gear case	30.00	21.00
Car wheel	15.00	10.00
Gear	57.00	40.00
Normal h.p.	42 (500 V.)	25 (600 V.)
Continuous capacity	30 Amps.	35 Amps.
Continuous tractive effort..	330 lbs.	600 lbs.

It is quite true that we had gradually adopted the 40,000 lb. car, partly due to pressure from city, other authorities and the public, who were pleased with the interurban cars coupled with a desire to carry as many passengers as possible for the platform wages of two men and reduction in number of cars required necessary to handle the traffic, but times have changed and the advent of the automobile demands that the electric railways give quick and very frequent service or lose out, and there are some, who, although aware of the change taking place, have not learnt how to combat it. Some properties have a condition where all the cars operate down about say half a mile of a street of stores, resulting in one minute or less headway, causing most undesirable congestion of street cars, autos, etc., and loss of time. After leaving the street the cars radiate off in different directions on five, ten or fifteen minutes headway. On account of the one street the whole system is penalized, when with re-routing and possibly one or two short lengths of track the congestion is relieved, Safeties installed, new traffic created, adding some 30 per cent. to the net. This sounds too good, but such a thing has already been accomplished and there are great possibilities with the Safeties. They are, however, not a cure for all, but form part of the medicine needed for our present disease. The car has its place in every railway system, including Montreal, and I think you will see it there. Why not? It is in Brooklyn, Boston and Philadelphia, and its record is such that no one can now afford to disregard it. I do not, however, mean to insinuate that the car can replace double-truck cars under conditions similar to St. Catherine Street, Montreal, nor do I say that the car should not receive the benefit of improvements providing that certain limitations are not overstepped. I do say, however, that it has been found that the car will adapt itself to the conditions and conditions to the car.

The Wagner Electric Company have issued two new bulletins, 127 and 128, dated March, 1921. Bulletin No. 127 deals with single phase motors, and bulletin No. 128 with distribution type transformers. Both bulletins are well illustrated and contain a great deal of useful and interesting information.

Type F Automatic Starters for Squirrel-Cage Induction Motors is the title of Leaflet 1660-A, which is being circulated by the Westinghouse Electric & Manufacturing Company, East Pittsburgh. These starters are the transformer type of 400 horse-power rating, 22 volts maximum; and the resistance type, 35 horse-power, 550 volts maximum. The leaflet illustrates the use of the gauge type pressure regulator, the enclosed type float switch, the diaphragm pressure regulator and the push button starter.



Snow several feet high on both sides of the tracks.

traffic conditions and it's no use you and I saying it does not. It creates traffic and is a money-getter, we cannot deny it, for it is to be seen any time you wish.

Increase in Revenue

I know personally of two properties of 50,000 and 80,000 population, which were running \$1,000 and more per month in red figures. They now have 100 per cent. safety car operation and \$12,000 and more in black figures per month. On another property, 170,000 population, the headway with Safeties was cut in half on one division, resulting in picking up some additional 33,000 revenue passengers per month, who used to either walk or use some other mode of conveyance. You can see even to-day many cities where 40,000 lb., 140

Current News and Notes

Brantford, Ont.

The Lyons Electric Co., 72 Colborne St., Brantford, Ont., has been awarded the contract for electrical work on residence recently erected at 204 Brant Ave., Brantford.

The plans of the new extensions to the Hydro sub-station and system, Brantford, have been approved by the Brantford Commissioners and forwarded to the Ontario Commission for approval. When this is granted work on the building will be commenced.

Halifax, N.S.

A largely signed petition was recently presented to the Nova Scotia legislature by Attorney-General O. T. Daniels, member for Annapolis county, asking for immediate consideration of the development of the water power resources of Western Nova Scotia. The petition states that without power for industrial development the western part of the province cannot make the progress other parts are making, and points out the geographical advantages of Bear River and other sections of the country in respect to availability of raw materials and proximity to St. Johns, N.B., where steamship connection would be obtainable. It is stated that the east branch of Bear River, if developed, can furnish 7,500 horse-power and that double that amount is available from other sources. The petition will come up for consideration at an early date.

Hamilton, Ont.

A recommendation of the Works Committee for the installation of 59 street lights in the east end of the city was passed recently by the Council over the head of the Board of Control. It was declared by members of the Council that the dark streets were an incentive to crime, and were preventing workmen from building in the newer portions of the city.

Kingston, Ont.

An audit of the Hydro-electric Commission shows that the electrical plant at Kingston, Ont., for the last year had a gross surplus of \$31,577, or a profit of over 20 per cent. Collections of the domestic rates have been made monthly during recent years; the Provincial Commission recommends that bi-monthly collections be made.

Kitchener, Ont.

J. H. Edmunds & Co., Kitchener, Ont., have been awarded the contract for electrical work on a theatre building recently erected in that town for the Independent Theatres of Ontario, Ltd., at a cost of \$150,000.

London, Ont.

Mr. E. V. Buchanan, general manager Public Utilities Commission, London, Ont., has been asked to make a report on the cost of laying all wires underground in the downtown district.

It is reported that work will start very shortly on a \$40,000 sub-station for the Hydro-electric Power Commission in London. The work will be done under the direct supervision of the general manager, Mr. E. V. Buchanan.

Medicine Hat, Alta.

The city of Medicine Hat has placed an order with Babcock & Wilcox Company for one 500 h.p. boiler, superheater, valves and piping, for an addition to their power and

water plant. Mr. G. R. Taylor is superintendent of Utilities for Medicine Hat.

Montreal, Que.

The Montreal Tramways Co., Montreal, Que., will shortly commence extension work on Kelly St., Montreal.

A tramway line over Mount Royal, Montreal, Que., will be constructed this spring, providing easy access to the summit from all districts. By the construction of this line a double track service over the Mountain will be possible between the north and south sections of the city.

Mr. J. A. St. Amour, 2171 St. Denis St., Montreal, has been awarded the contract for electrical work on a building that is being altered to a school for the R. C. School Commission, Montreal, at an estimated cost of \$160,000.

Niagara Falls, Ont.

The annual report of the Niagara Falls Power Company, and the Canadian Niagara Falls Power Company, for the year 1920, shows gross earnings of \$3,997,801, as compared with \$3,632,664 a year ago. After the usual deductions the net income is \$2,241,149, an increase of approximately \$157,000 over the previous year.

Ottawa, Ont.

The British Columbia Telephone Company has filed with the Board of Railway Commissioners an application for increases in exchange rentals and telephone charges amounting to \$397,000.

Sarnia, Ont.

The Smith Electric Co., 215 Front St. N., Sarnia, Ont., has been awarded the contract for electrical work on two residences being erected in Wal-Jan Park sub-division, Sarnia.

Stratford, Ont.

Mr. F. Armstrong, Clerk of the Perth County Council, Stratford, Ont., will receive tenders on electric wiring and fixtures for the County Court House, Jail and Registry Office up to April 4th.

Mr. Harold Duggan, Stratford, Ont., has opened an electrical store at 62 Huron St., Stratford, where he will carry a full line of electrical supplies.

The Monteith-Dempsey Rural Telephone System was given permission by the Ontario Railway and Municipal Board, at a recent sitting in Stratford, Ont., to increase its rates from \$16 to \$22 per annum, effective April 1st, 1921.

Sherbrooke, Que.

The Wigget Electric Company, 71 Wellington St., Sherbrooke, Que., are asking for prices on the following motors: 1-50 h.p. 900 r.p.m.; 1-40 h.p. 900 r.p.m.; 1-20 h.p. 1200 r.p.m.; 1-15 h.p. 1200 r.p.m.; 1-10 h.p. 900 and 1200 r.p.m. and 1-5 h.p. 1200 and 1800 r.p.m., all to be 3 phase 60 cycle, 550 volts.

Three Rivers, Que.

Mr. P. Rochon, 84 Royale St., Three Rivers, Que., has been awarded the contract for electrical work on a tenement house being erected at Three Rivers for Mr. L. O. Trottier, 120 Bonaventure St., at an estimated cost of \$15,000.

Mr. E. Girard, 4 Bellefeuille, Three Rivers, Que., has been awarded the contract for electrical work on workmen's residences being erected at various locations in Three Rivers at an estimated cost of \$100,000.

Toronto, Ont.

At the annual meeting of the Northern Ontario Light & Power Co., held in Toronto, March 16th, it was announced

that the gross earnings had increased \$74,301.54 over that of the previous year. This would have been much greater had it not been for the limited amount of rainfall during the season which seriously curtailed the output.

The Ontario Gazette announces the incorporation of the Electric Refrigerators, Limited, with head office at Toronto, for the purpose of manufacturing and dealing in electrical refrigerators and other electrical lines.

The Canadian Edison Appliances, Ltd., will open a service station at 25 Melinda St., Toronto.

The O. B. & G. Electric Co., 95 Wood St., Toronto, Ont., has been awarded the contract for electrical work on a residence to be erected on Forest Hill Road, Toronto, at an estimated cost of \$30,000.

Messrs. Douglas Bros., 2137 Yonge St., Toronto, have been awarded the contract for electrical work on a residence recently erected on Whitney Ave. for Mr. W. E. Wilder at a cost of \$20,000.

W. Commeford, 261 College St., Toronto, has been awarded the contract for electrical work on a residence recently erected on Wells Hill, Toronto, at a cost of \$26,000.

Mr. P. H. Coe, 32 Kennedy Ave., Toronto, has been awarded the contract for electrical work on a duplex residence erected at the corner of Kennedy & Glenwood Ave., at a cost of \$10,000, for Mr. J. A. Moss, 183 Beresford Ave.

Mr. N. McLeod, 690 Danforth Ave., Toronto, Ont., has been awarded the contract for electrical work on residence being erected at 21 Linsmore Crescent for Mr. A. W. Chamberlain.

Vancouver, B.C.

Mr. R. N. Dicer, 1256 Pender St. W., Vancouver, B.C., has been awarded the contract for electrical work on a show room which is undergoing alterations at 309 Cordova St. W., Vancouver.

Victoria, B.C.

Mr. T. L. Boyden, 1126 Broad St., Victoria, B.C., has been awarded the contract for electrical work on a residence recently erected on Shelbourne St., Victoria.

The Murphy Electric Co., 602 Sayward Block, Victoria, B.C., has been awarded the contract for electrical work on a \$5,000 bungalow being erected at Fairfield Terrace, Victoria, for Mr. H. H. Boyle, 937 Oliver St.

Messrs. Fox & Mainwaring, Pemberton Block, Victoria, B.C., have been awarded the contract for electrical work on a residence recently erected on Hollywood Crescent, Victoria, for Mr. Geo. McLaughlin, Westholme Hotel.

Westmount, Que.

Mr. O. Labelle, 347 Addington St., Westmount, has been awarded the contract for electrical work on a building at 1379 Greene Ave., Westmount, that is being altered to apartments.

Windsor, Ont.

Mr. F. W. Dewar, Manager of the Bell Telephone Co., Windsor, Ont., states that in ten years time telephones in use in the Border Cities has increased from 1,500 to over 7,000.

Yarker, Ont.

The Ontario Gazette announces the incorporation of The Yarker Rural Telephone Co. Ltd., with head office at Yarker, Ont., with a capital of \$5,000.

Yarmouth, N.S.

Jas. H. Crosskill, Yarmouth, N.S., has been awarded the contract for installing lights at the post office entrances, Yarmouth. Five light clusters will be used, placed on the outer edge of the sidewalks.

B. C. E. R. Strike Settled

After being out on strike just over two weeks, the electrical workers in the employ of the B. C. Electric Railway Company went back to work, a settlement of the difficulties between the men and the company having been reached, according to statements given out officially by both parties to the dispute. The successful outcome of the negotiations was welcomed by the public, the company and the men, as various previous efforts to effect a settlement had met discouragement and failure. The men went out on Feb. 22, to obtain the terms of the arbitration award of the conciliation board which sat last November to adjust the differences between company and men. The company had refused to be bound by the decision of the board of arbitration, and the men took the ground that the decision should be accepted by both parties as binding on them. The issue was that the company did not feel able to maintain existing rates of wages, though the men outlined possible demands for increased pay. The conciliation board ruled that increases were not warranted, but that on the other hand, the time was not opportune for reductions. The company desired an agreement for six or twelve months on the existing scale of wages, provided an adjustment clause was inserted, the wages to be adjusted every three months on a sliding scale governed by the cost of living. Other offers were made, one being to pay the wages offered by the company, and hold another arbitration, the finding of which the parties would agree to bind themselves. As all offers were rejected, the company finally conceded the men's claim, with the proviso of a thirty day notice from either side to terminate the agreement.

Northern Electric Co.'s Annual

The annual general meeting of the shareholders of the Northern Electric Company, Limited, was held March 10th, when the following directors were elected for the ensuing year: Messrs. Hugh Paton, L. B. McFarlane, P. F. Sise, F. W. Molson, A. J. Brown, J. D. Hathaway and R. H. McMaster, of Montreal; Messrs. H. A. Halligan and G. E. Pingree, of New York; Mr. T. Ahearn, of Ottawa; Mr. H. F. Albright, of Chicago. At a subsequent meeting of the directors, Mr. P. F. Sise was elected president and Mr. J. D. Hathaway vice-president.

Walkerville Shows Good Surplus

The Walkerville Hydro-electric System, Mr. M. J. McHenry, manager, has issued its annual report which shows a surplus of \$37,028. As indicating the progress during the past year, in which the total revenue has been increased by 45½%, the following figures of individual increases are interesting: Population served, 2,290, an increase of 17½%; consumers connected, 633, an increase of 23½%; power load, h.p., 1,287—48% increase; domestic consumption, kw. hours 794,660—125%; commercial consumption, kw. hours, 146,814—31%; total revenue, \$68,270.33—45½%; domestic revenue, \$18,710.20—55%; commercial revenue \$5,515.00—71%; power revenue, \$46,093.10—54%; total expenditure \$32,514.44—57%.

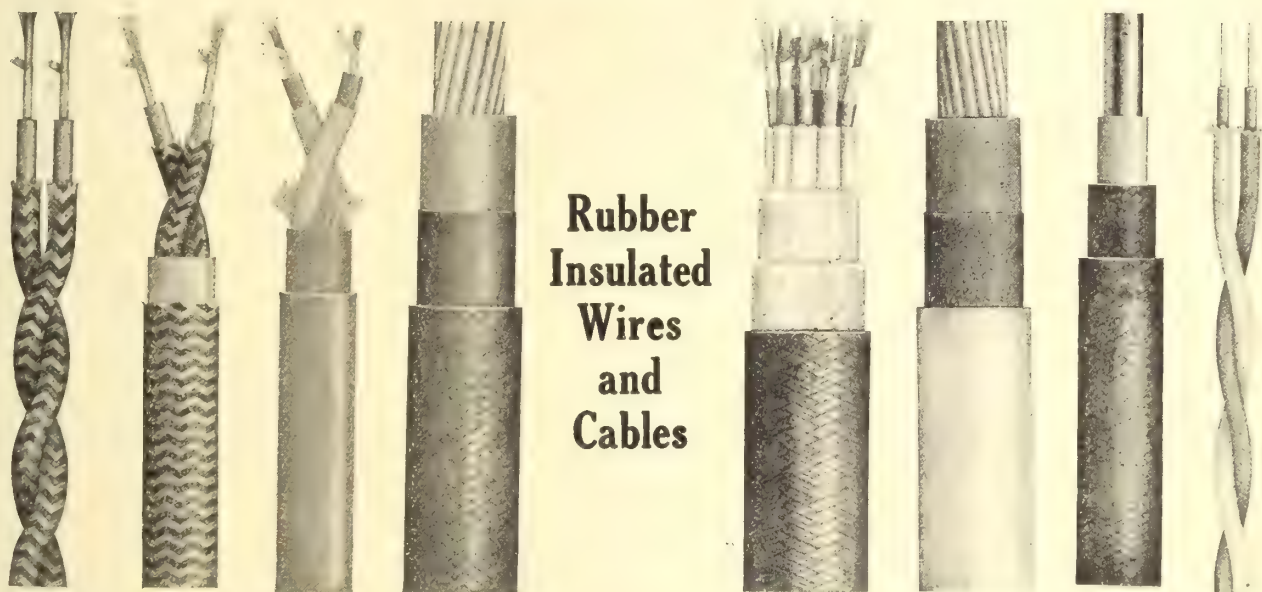
Pittsburg Radio Telephone Heard in Arizona

Word has been received from Meade W. Powell, of Warren, Arizona, a distance of 1,600 miles from East Pittsburg, to the effect that he receives clearly, every night, the entertainments sent out from the experimental wireless telephone station of the Westinghouse Electric & Manufacturing Company. This is the farthest distance from which a report has been received at East Pittsburg of hearing the programme, which is sent out each night from the experimental station.

WIRES AND CABLES

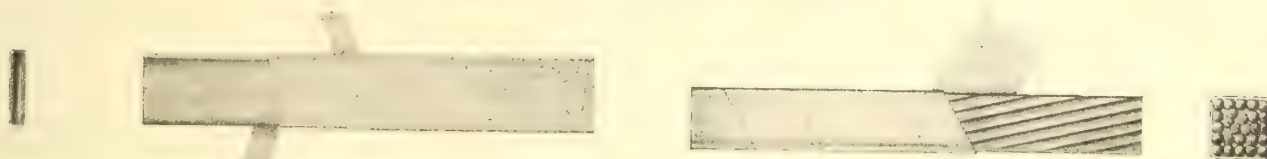
Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889



**Rubber
Insulated
Wires
and
Cables**

Magnet Wires and Cables



Power Cables



**Weatherproof Wire
Cadmium-Copper Wire**

**Trolley Wire
Enamelled Wire**

Telephone Cables

Head Office and Factory

-

MONTREAL

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1.
Walter Clinton, Welland, Ont. 22-7

For Sale

10— $\frac{1}{2}$ H.P., 250 V., D.C. 3400 R.P.M. Motors made by Electrical Specialty Co., Stamford, Conn. Have been used for supplying suction to machines. Fans, Casings and Pipes can also be supplied if desired.

Also the following Electric Light Shades with 4-light attachments, suitable for Factory lighting:
28—20 inch.
13—18 "
1—16 "

Apply Box 532, Electrical News, Toronto. 7

For Sale

450 kv.a. Hydro Electric Equipment.

One new C.G.E. 450 kv.a., 400 r.p.m., 6,600-volt water wheel type generator.

One exciter for above.

One new double runner S. Morgan Smith unit, 37 feet head for direct connection to above. Switchboard complete.

This equipment will be sold in whole or part. The hydraulic equipment is at York, Pa., and the electrical equipment is at Peterboro, Canada.

The Nova Scotia Power Commission,
Halifax, N. S. 5-8

For Sale

Sash, door and planing mill machinery, boilers, engines, motors, pulleys, gears, machine shop & moulding machinery, 8 ft. Linderman glue jointer. Full printed list on request to Cargill Limited, Cargill, Ontario. 5-8

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-t.f.

Hardware Market in Lahore

Hardware merchants in Lahore buy their stocks mostly in Calcutta and Bombay, though they also buy direct from England, the United States, and Germany. Some hinges and files are bought direct from Sweden and Norway. The majority of the wire nails are imported from the United States, though the merchants are beginning to buy them from Belgium as the exchange now favors Europe, since it takes 400 rupees to buy \$100 exchange. Various kinds of tools and machinery come from Germany. Quite a line of hardware is carried in stock, including hacksaws, files, brass and steel screws, wire nails, brass and iron hinges, boxwood rules, screw hooks, curtain hook, galvanized iron for roofing, galvanized bolts and nuts, paints and colors, faucets, augers, etc.

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

ELECTRICAL SALESMAN WANTED, one with knowledge of motors, generators, etc., speaking French and English for the Province of Quebec. Apply to Electric Motor & Machinery Co., Ltd., 417 St. James Street, Montreal, Que. 6-7

ELECTRICAL MOTOR SALESMAN wanted for the Province of Ontario. Apply stating experience, etc., to Electric Repair & Contracting Co., Ltd., 413 St. James Street, Montreal, Que. 6-7

Electrical Superintendent desires position; would consider a municipal hydro and waterworks connection, or an industrial plant electrical position; good references and can get results. Box 544, Electrical News, Toronto. 7-10

Wanted

Hydro-electric power house operators for high voltage power house operation. Must be familiar with operation of Lombard governors and Terrill regulators. Give details regarding experience, age, salary and references. Box 546, Electrical News, Toronto. 7-9

Wanted

Hydro-electric Power Superintendent and Maintenance Engineer on high voltage operation, also maintenance of D.C. and A.C. equipment. Familiar with operation of Lombard governors and Terrill regulators. Give details regarding experience, age, salary, references and enclose small photo. Apply Box 550, Electrical News, Toronto. 7

Belgian Steel Plants Form Combine

U. S. Acting Commercial Attache Cross, of Brussels, Belgium, recently reported that a number of Belgium steel plants have formed a combination for joint action after recovery from war damages. This combination is formed for the purpose of distributing raw materials and for the sale of finished products and replaces the former Comptoir des Acieries Belges. The following companies compose the organization: Cugree, Marihay, Cockerill, Providence, Angleur, Hainaut, Thy le Chateau, Athus, Grivignee, Esperance Longdoz, Cibecq, Moncheret, Bonehill, Halanzy, and Chatelineau.—Commerce Reports.

Erection of New Steel Plant in South Africa

The South African Iron & Steel Corporation (Ltd.) has definitely announced its plans to begin soon the erection of a new plant capable of producing 75,000

tons of finished and semi-finished steel per annum. The plant is to be equipped with electrically-driven steel-rolling mills, steel furnaces, and coke ovens fitted with the most up-to-date equipment for the recovery of tar, sulphate of ammonia, and benzol, and probably with electric furnaces. It is estimated that £2,200,000 will be spent on the new installation.

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710	Wagner
" 1	75	3	25	550	480	Westg.
" 1	60	3	25	550	750	Cr. Wh.
New 2	52	3	25	550	720	Lane
Used 2	30	3	25	550	720	Westg.
New 2	35	3	25	550	720	Westg.
Used 1	30	3	25	550	1500	Tor. & Hm.
" 2	30	3	25	550	750	J. M.
Used 1	25	3	25	550	750	C. G. I.
" 1	25	3	60	220	720	Cr. Wh.
New 1	25	3	25	550	715	Lane
New 1	15	3	25	550	1450	Westg.
" 1	15	3	25	550	750	Lincoln
" 6	15	3	25	550	720	Westg.
New 2	15	3	25	550	700	Lane
" 2	10	3	25	550	720	Westg.
Used 1	7 $\frac{1}{2}$	3	25	220	1500	Tor. & Hm.
" 1	7 $\frac{1}{2}$	3	25	550	1450	C.G.E.
New 1	7 $\frac{1}{2}$	3	25	550	725	Westg.
Used 1	7 $\frac{1}{2}$	3	25	550	700	Lane
Used 1	6	3	25	220	1450	Lane
New 1	5	3	25	550	1400	Excelsior
Used 1	5	3	25	550	1400	J. & M.
Used 1	5	3	60	200	1120	Westg.
New 1	5	3	25	550	710	Wagner
New 3	3	3	25	550	1500	Lane
" 5	3	3	25	550	1400	Westg.
" 4	3	3	25	550	1400	Excelsior
Used 1	2	1	60	110	1750	Wagner
New 2	2	3	25	550	1400	Excelsior
" 2	2	3	25	550	1425	Lane
" 1	1 $\frac{1}{2}$	1	25	110	1420	Wagner
Used 1	1	3	25	220	1500	Tor. & Hm.
New 1	1	1	25	110	1440	Wagner
" 1	1	3	25	550	1425	Lane

Write for Prices

H. W. PETRIE, Limited
131 Front St. West - Toronto Ont.

MORE BUSINESS

Indications are that competition for building and engineering contracts will be very keen during 1921. Don't let your competitors walk off with the orders leaving your sales department is even advised of the jobs. You can avoid this by making use of MacLean Building Reports. They tell you of work contemplated in the

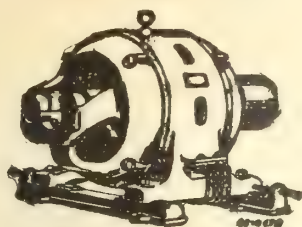
Building and Engineering

trades. They will bring you, each day, an up-to-date report on building operations of interest to you, from the time when the project is contemplated until the work is fully completed. Every MacLean Report is verified. You can count on your system on definite prospects.

Write for full information
MacLean Building Reports, Limited
345 Adelaide Street West, Toronto
Phone No. Ade 778

MacLean Building Reports Limited

345 Adelaide St. W. - - TORONTO
119 Board of Trade Bldg. - MONTREAL
348 Main St. - - WINNIPEG
218 Winch Bldg. - - VANCOUVER



Machines *In Our Montreal Stock*

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new "Kuhlman" Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately three to four weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.
 1—300 H.P. 300 RPM. Slip Ring.
 2—300 H.P. 490 RPM.
 1—100 H.P. 600 RPM.
 2—75 H.P. 1200 RPM.

3 Phase 60 Cycle 550 Volt.
 2—200 H.P. 600 RPM. Slip Ring.
 1—100 H.P. 600 RPM. Slip Ring.
 1—100 H.P. 600 RPM.
 2—75 H.P. 900 RPM.
 1—50 H.P. 900 RPM. Slip Ring.
 4—50 H.P. 900 RPM.
 3—50 H.P. 1200 RPM.
 2—40 H.P. 1200 RPM.
 4—35 H.P. 1200 RPM.
 4—35 H.P. 900 RPM.
 1—35 H.P. 600 RPM.
 3—30 H.P. 1200 RPM.
 2—30 H.P. 900 RPM.
 1—25 H.P. 900 RPM.
 1—25 H.P. 1200 RPM.
 1—20 H.P. 900 RPM.
 2—15 H.P. 900 RPM.
 1—15 H.P. 1200 RPM.
 1—10 H.P. 1800 RPM.
 2—10 H.P. 1200 RPM.
 3—10 H.P. 720 RPM.
 1—8 H.P. 810 RPM. Crane
 2—7½ H.P. 900 RPM.
 7—7½ H.P. 1200 RPM.
 2—7½ H.P. 1800 RPM.
 2—5 H.P. 900 RPM.

14—5 H.P. 1800 RPM.
 1—4 H.P. 1140 RPM. Crane
 22—3 H.P. 1800 RPM.
 12—3 H.P. 1200 RPM.
 15—2 H.P. 1800 RPM.
 14—2 H.P. 1200 RPM.

3 Phase 60 Cycle 440 Volt
 2—50 H.P. 900 RPM.
 8—30 H.P. 900 RPM.
 2—30 H.P. 850 RPM.

Single Phase 30 Cycle 110/220 Volt
 1—1/8 H.P. 1415 RPM.
 2—1/6 H.P. 1750 RPM.
 1—1/2 H.P. 1420 RPM.

3 Phase 60 Cycle 220 Volt.
 1—75 H.P. 900 RPM.
 1—60 H.P. 900 RPM.
 2—50 H.P. 900 RPM.
 2—40 H.P. 900 RPM.
 1—30 H.P. 1200 RPM.
 1—25 H.P. 900 RPM.
 1—20 H.P. 1200 RPM.
 1—15 H.P. 1200 RPM. Slip Ring
 3—10 H.P. 1800 RPM.
 2—7½ H.P. 1750 RPM.
 3—7½ H.P. 1200 RPM.
 2—5 H.P. 900 RPM.
 5—5 H.P. 1200 RPM.
 2—3 H.P. 1200 RPM.
 1—2 H.P. 1200 RPM.
 1—1/2 H.P. 1800 RPM.

Single Phase 60 Cycle 110 Volt.
 1—7½ H.P. 1800 RPM.
 5—5 H.P. 1800 RPM.
 9—3 H.P. 1800 RPM.
 13—2 H.P. 1800 RPM.
 2—1½ H.P. 1800 RPM.
 4—1 H.P. 1800 RPM.
 1—3/4 H.P. 1800 RPM.
 22—1/2 H.P. 1800 RPM.
 13—1/3 H.P. 1800 RPM.
 25—1/4 H.P. 1800 RPM.
 21—1/6 H.P. 1800 RPM.
 2—1/6 H.P. 1200 RPM.
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 5—1/8 H.P. 1800 RPM.

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 1—30 K.V.A. 2200/110 Volts.
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 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
 1 10 hp. C.W. 750 rev., starter, rails, pulley.
 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
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 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 SPLIT PHASE
 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
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 (without starter)
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 1—5 " C.G.E. motor 180.00
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 8—10 " C.G.E. and Westinghouse motors
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1 7½ H.P. Westinghouse, 1450 RPM., new, each...	420.00
2 15 H.P. Crocker-Wheeler, 725 RPM., new, each...	625.00
All above 3 phase motors have base and pulley. 7½ H.P. and up have approved starters.	
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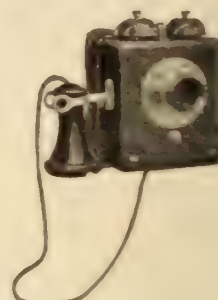
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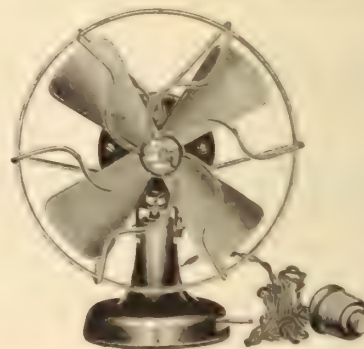
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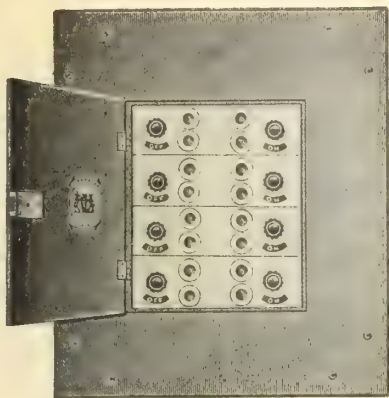
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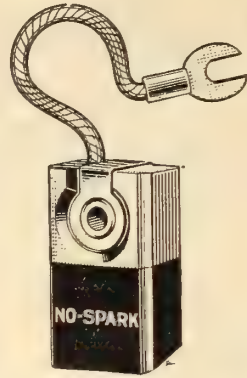
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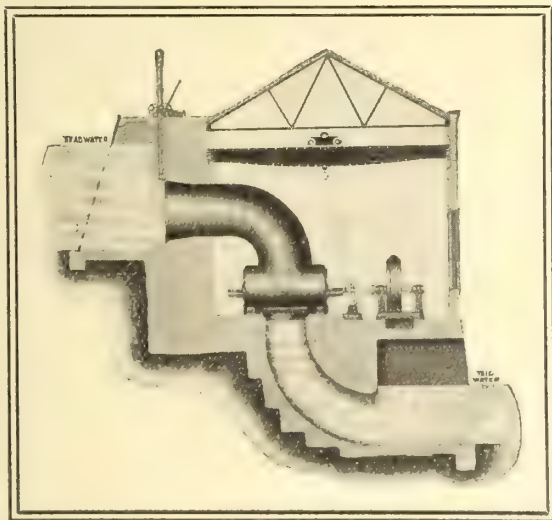
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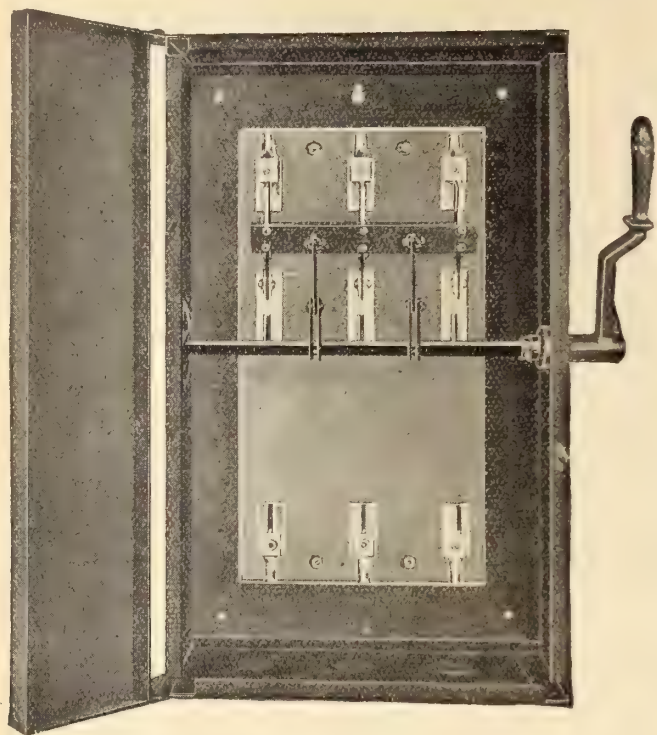
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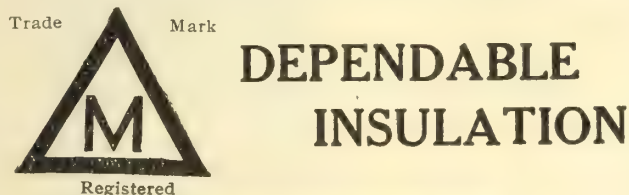
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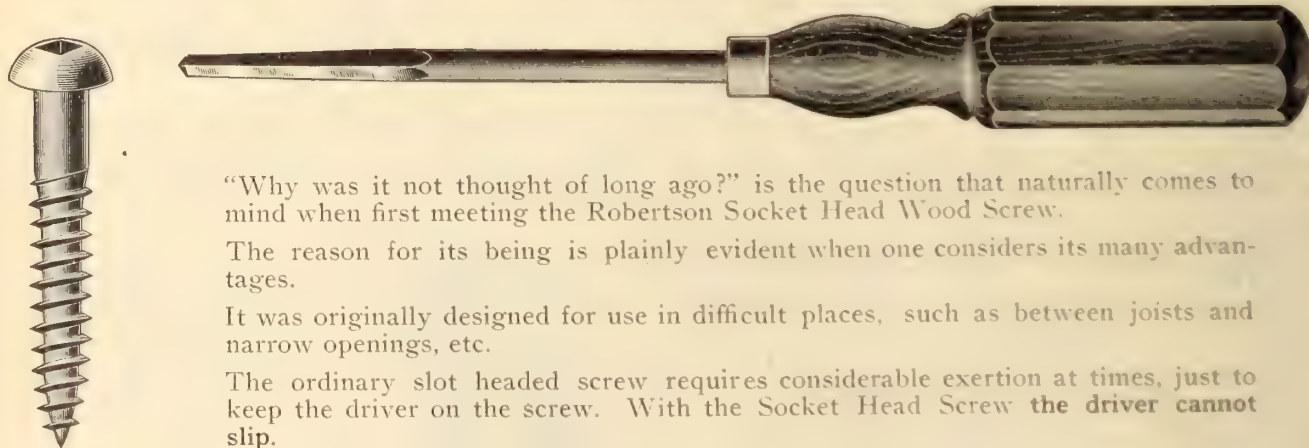
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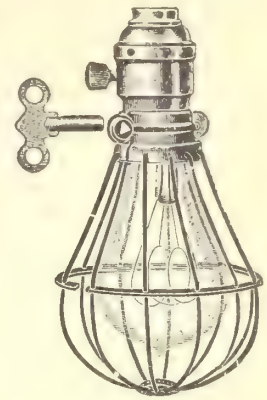
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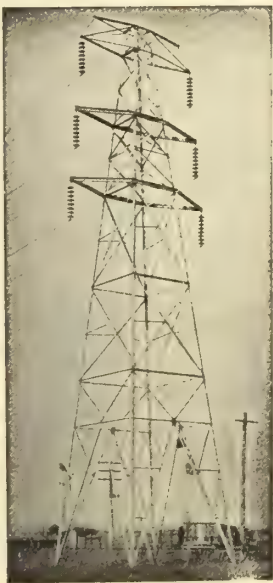


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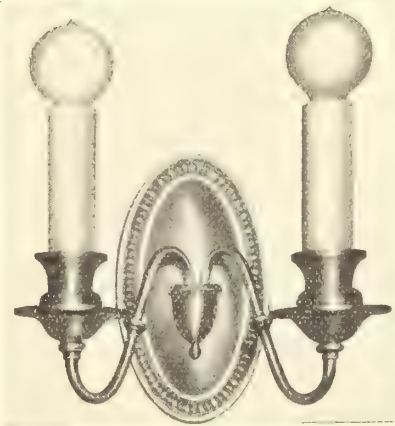
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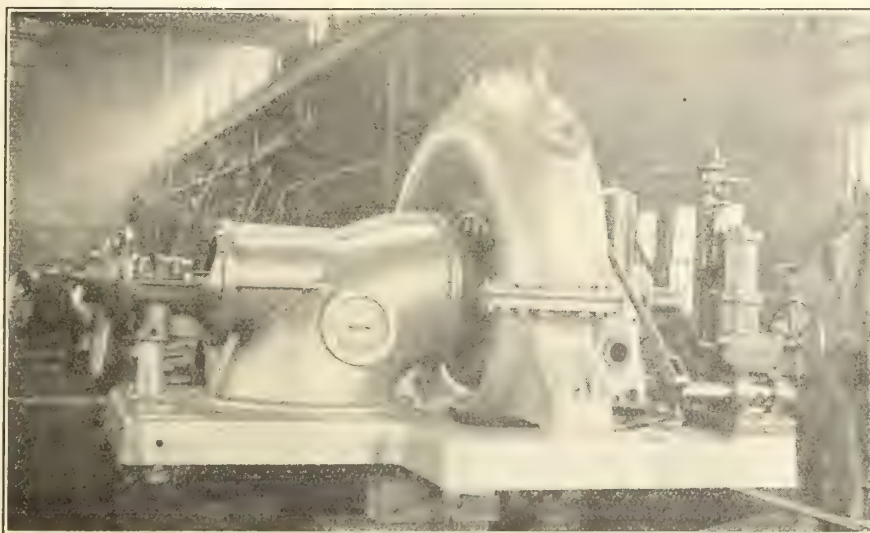
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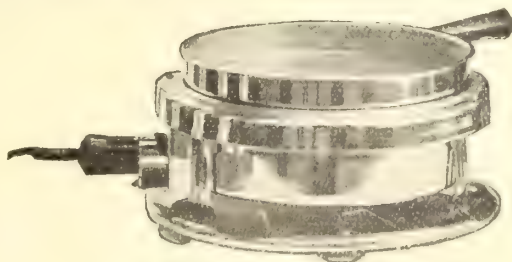
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Canada Wire & Cable Company
International Machinery & Supply Co.
McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited

WIRING DEVICES

Canadian General Electric Company
Hatheway & Knott, Inc.
Northern Electric Company

WOOD SCREWS

Robertson Mfg. Company, P. L.

WRINGERS (Power)

BlueBird Corporation, Limited



The Perfect Insulation

BAKELITE-DILECTO

embodies all the extremely desirable qualities of the ideal insulation. It is tough, practically waterproof and possesses extraordinary dielectric strength, meeting every requirement of electrical insulation no matter how complex the application.

BAKELITE-DILECTO

CONTINENTAL - BAKELITE, ETC.

VULCANIZED FIBRE

in sheets, rods, tubes and special shapes and Conite is made in sheets or rolls from .005" to .020" thick.

The Continental Fibre Co.

Newark, Del.

New York Office:
233 Broadway

Pittsburgh Office:
301 Fifth Avenue.

Los Angeles Office:
411 S. Main Street.

Chicago Office:
332 S. Michigan Ave.

San Francisco Office:
525 Market Street.

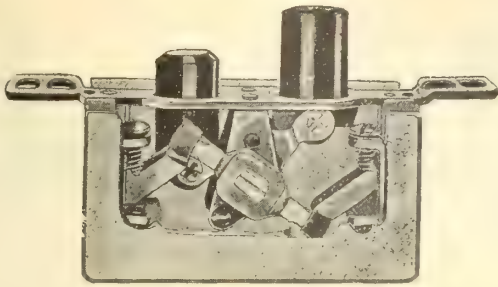
Canadian Office:
Cor. King and Yonge Sts.,
Toronto, Ont.

Canadian Agent

Frank T. Groome

1710 ROYAL BANK BLDG.

Toronto Phone Adel. 106



A Switch You Should be Using

The New England Push Switch is one you can recommend because its serviceability has been proven beyond a doubt—by the Underwriters themselves. Our Canadian Agent will gladly furnish you with full information.

JOHN I. PAULDING, Inc.

Manufacturers of Switches,
Fuseless Rosettes and Por-
celain, Waterproof Sockets.

New Bedford, Mass.

CANADIAN
AGENT:

FRANK T. GROOME

1710 Royal Bank Building,

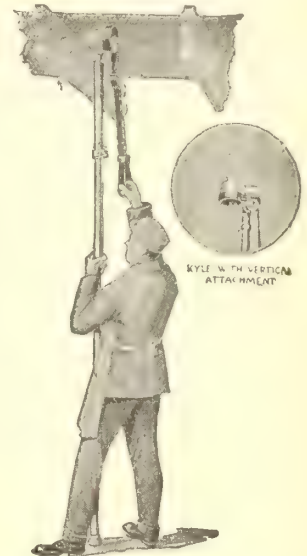
Cor. King and Yonge Sts.

TORONTO

Phone Ad. 106

Can You Afford?

to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine? Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.



BE FIRST

Canadian Hykon Company

55 John St. South

Hamilton, Ont.



"Just What I Want"

This is exactly what you, or any one else, will say after having bothered around with loose extension cords.

The Automatic Extension Reel for Electric Lamps

Obviates the necessity of dragging your cord over the floor, thus wearing out insulation and breaking sockets, guards, etc. Takes your light just where you want it, locks at any point, and automatically rewinds your cord when you are through with light. Contains 25 feet of approved reinforced weatherproof cord.

Approved by the Underwriters, and endorsed by fire and electrical bureaus everywhere. Fully protected by two basic patents and more pending. Write for further particulars and prices.

The Cincinnati Specialty Mfg. Co. Inc.

1907-19 Powers St., West, Cincinnati, Ohio

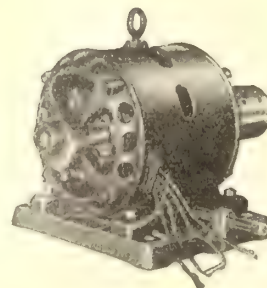
Canadian Agents:

Richard James & Co., Regd., 83 Craig St. W., Montreal, Can.

Century

Repulsion Start-Induction

Single Phase Motors



Ratings
1/10 to 40 H.P.

of standard construction have long enjoyed a reputation for quiet operation. Today they are used as regular equipment by many of the manufacturers of such apparatus as is installed in public buildings, churches, schools and residences.

CENTURY ELECTRIC CO.

19th, Pine to Olive Sts.,

ST. LOUIS, Mo., U.S.A.

Stock carried in Canada by:

Jones & Moore Electric Co., Ltd., 204 Adelaide St. W., Toronto

Great West Electric Co., Ltd., Winnipeg

Rudel-Belnap Machinery Co., Ltd., Canadian Express Bldg.

Montreal

Rankin & Cherrill, 55 Hastings St. W., Vancouver, B.C.

Westinghouse

Distribution Transformers



Reliability, Durability and Efficiency

These qualities of Westinghouse Distribution Transformers are secured by distinctive and unique features in design and construction, which assure uniformity of performance.

One of these features is the use of micarta barriers between windings. These barriers are continuous and uniform in mechanical and dielectric strength and contain several layers of pure mica insulation.

Our nearest office will be glad to tell you of many other features.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 168 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.

SERVICE STATIONS:—

MONTREAL—10 St. Sophie Lane
TORONTO—366 Adelaide St. W.

VANCOUVER—1090 Mainland St.

WINNIPEG—168 Portage Ave. E.
CALGARY—316 Third Ave. E.



A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

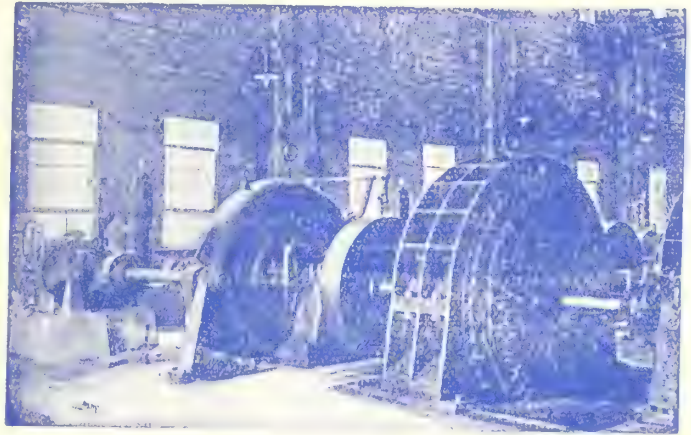
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

Monarch Locking Lamp Guards



☐ Your customers will be glad to use these guards. They are made of strong steel parts, rigidly assembled and heavily tinned.

☐ Your cost on them is extremely attractive.

☐ You are guaranteed a good profit and proper protection by our distributing policy. Write us for prices.

MADE BY CANADIAN LABOR

Monarch Electric Company, Ltd.

St. Lambert,

District of Montreal

USED ELECTRIC MOTORS

IN STOCK MARCH 19th

ALTERNATING CURRENT

550 VOLTS, 3 PHASE			
1	H.P.	1800 R.P.M.	Westg.
3	"	1800 "	C.-Wheeler
3	"	1800 "	Thomson
5	"	1800 "	A. C. B.
5	"	1200 "	C.-Wheeler
5	"	900 "	C.-Wheeler
7 1/2	"	1200 "	Thomson
7 1/2	"	1200 "	Ampere
10	"	900 "	C.-Wheeler
15	"	1200 "	Westg.
15	"	1200 "	C. G. E.
15	"	1200 "	A. C. B.

550 VOLT, 3 PHASE (Con'd)			
15	H.P.	1200 R.P.M.	Wagner
20	"	1200 "	C.-Wheeler
25	"	900 "	C. G. E.
50	"	900 "	A. C. B.
75	"	900 "	Westg.
300	"	720 "	Westg.

220 VOLTS, 3 PHASE			
5	H.P.	1800 R.P.M.	Wagner
7 1/2	"	1800 "	A. C. B.
10	"	1150 "	S. G. E.
10	"	870 "	A. C. B.
75	"	850 "	Westg.
75	"	620 "	Westg.
100	"	720 "	Fairbanks

2200 VOLTS, 3 PHASE			
50	H.P.	1200 R.P.M.	A. C. B.
100	"	720 "	C. G. E.
200	"	514 "	C. Wheeler

1—250 KW. 250 volt, 3 phase, 60 cycle, 600 R.P.M. revolving field type

C.G.E. generator.

TRANSFORMERS

2—7 1/2	K.V.A.	2200-220/110	60 cycle	C. G. E.
2—15	K.V.A.	2200-550	60 cycle	C. G. E.
2—200	K.V.A.	2200-220/110	60 cycle	Packard

D. C. MOTORS AND GENERATORS

110 VOLTS			
6	K.W.	1850 R.P.M.	C.G.E.
6	H.P.	1465 R.P.M.	Westg.
10	"	700 "	G. E.
11	"	700 "	Westg.

220 VOLTS			
20	H.P.	1100 R.P.M.	C. G. E.
50	"	950 "	Westg.
100	K.W.	650 "	Bullock

500 VOLTS			
10	H.P.	1000 R.P.M.	A. C. B.
10	"	1400 "	C. G. E.
20	"	1000 "	Westg.
25	"	1050 "	Westg.
50	"	825 "	Westg.
60	"	900 "	A. C. B.

All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

9 ST. GENEVIEVE STREET

MONTREAL

SOMETHING TO REMEMBER

Below are listed some of the common applications of disconnecting potheads. If you will just add them to your mental list of "handy kinks" you will see the day when they will be the best, easiest and sometimes the only practical way.

USED AT THE END OF A LEAD CABLE: they enable you to test, to isolate underground from overhead, to cut over overhead to other cables. No cutting or splicing of wires. If used as the basis of an operating system practically any emergency can be met quickly and completely.

USED AS A DISCONNECT AHEAD OF AN OIL SWITCH: they are compact, simple in installation and mounting, least expensive and most positive in contact of any disconnect.

USED AS A DISCONNECT ON TRANSFORMERS: they permit the safe renewal of blown or shattered cutouts, the replacement of a transformer without cutting or splicing a wire. On three phase banks a defective transformer can be instantly cut out and the remaining two cut to open delta.

USED AS A DISCONNECT ON OVERHEAD LINES: they give satisfactory results in emergency work and in line safety work.

USED AS A DISCONNECT ON FEEDER VOLTAGE REGULATORS: they not only are disconnects but at the same time provide a means of changing the feeder from on to the bus with no extra switching arrangement.

USED AS A DISCONNECT AT ANY POINT: they are a safe, simple and economical device having the advantage of positive interlocking, completely enclosed contact and absolute visible disconnection mechanically and electrically—no chance for accident.

G & W ELECTRIC SPECIALTY CO.

Switching and Distribution Boxes, Overhead and Underground Distribution Specialties
Distribution Engineers, Manufacturers of Potheads of all kinds

7440-50 So. Chicago Ave.

CHICAGO, U.S.A.

A. H. Winter Joyner, Ltd., 62 Front St. W., Toronto.
A. H. Winter Joyner, Ltd., 10 Cathcart Street, Montreal

Bentz-Richardson Co., Ltd., 592 Notre Dame Ave., Winnipeg.
General Supplies, Ltd., Edmonton & Calgary



Electrical

News

Engineering
Contracting

Merchandising
Transportation



*If you haven't received a copy
of this new Hand-Book, write
for one now.*

National Metal Molding Co.

Advertising Dept., Pittsburgh, Pa.



The Pony Express
*An early Western method
 of Communication*

**30-conductor No. 14 B & S
 Rubber Insulated Braid-
 covered Telegraph Cable**

We have for years manufactured large quantities of this type of Telegraph Cable and to-day it is giving service in various sections of the country. We are always willing to manufacture special cable to meet a customer's requirements. We wish, however, to emphasize the fact that satisfaction results from the use of our standard designs, which are the result of long experience by our engineers.

**400 pair No. 22 B & S
 Paper Insulated Lead-
 covered Telephone Cable**

Lead-covered Telephone Cable for both Underground and Aerial Installation. The size illustrated is in great demand, as are also 600, 200, 100 and 50 pair cable. No. 22 B & S gauge conductors are supplied in cables for subscribers' lines, whereas No. 19 B & S and larger are employed in toll line cables. Composite Cables containing conductors of two or more different gauges are also made.

*Largest Canadian Manufacturers of
 Bare and Insulated Wires and Cables*

Northern Electric Company
 LIMITED

MONTREAL
 HALIFAX

QUEBEC
 OTTAWA

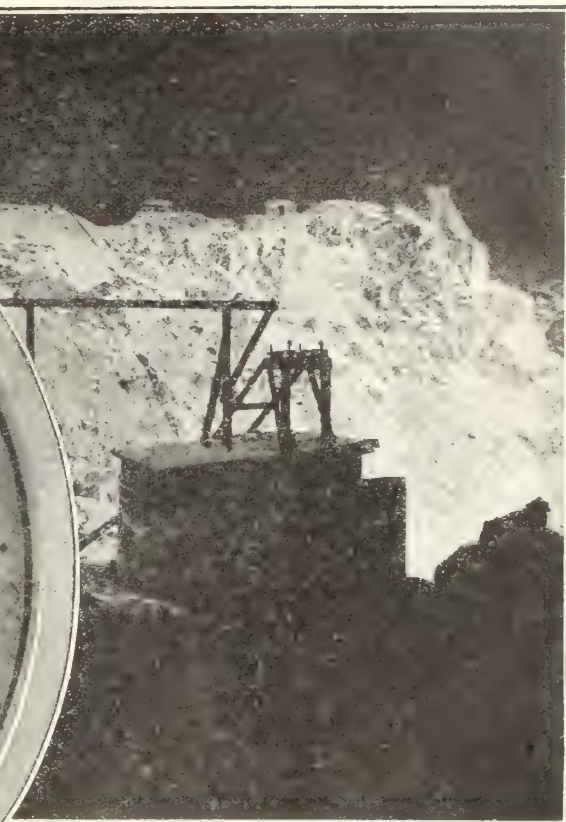
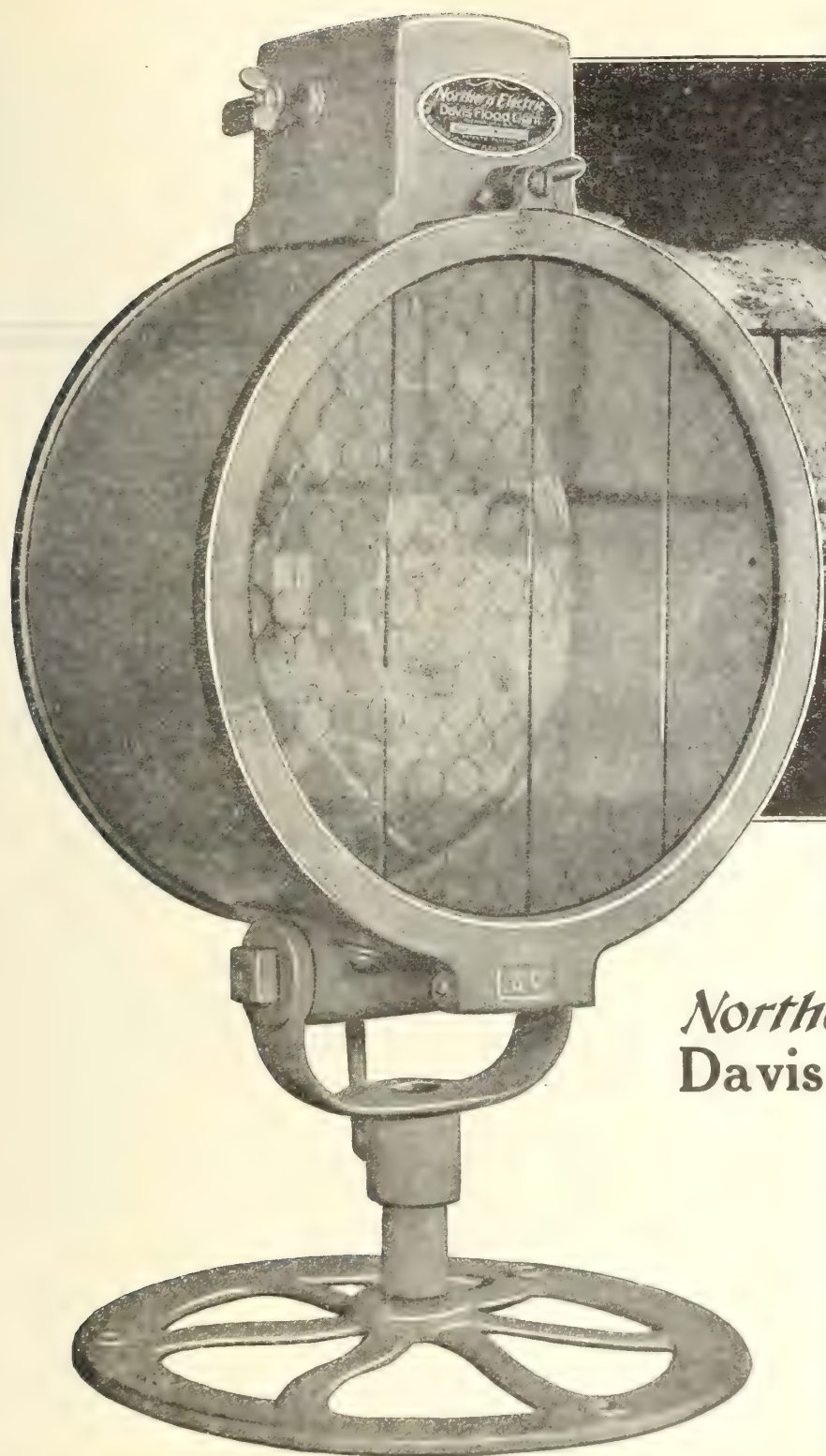
TORONTO
 HAMILTON

LONDON

WINDSOR
 WINNIPEG

REGINA
 CALGARY

EDMONTON
 VANCOUVER



One of our Floodlight Installations at Thetford Mines, Quebec

Northern Electric **Davis Floodlights**

Give daylight after dark and double your outdoor working hours with bright, steady light free from glare, actually flooding the scene on which it is projected. Portable, simple to adjust and operate, yet substantially built to withstand the rigors of exposure.

Northern Electric Company LIMITED

Montreal	Quebec	Toronto	London	Regina	Edmonton
Halifax	Ottawa	Hamilton	Windsor	Winnipeg	Vancouver



Sales That Grow

THAT'S the kind you want, isn't it? Price low—quality high—good profits—a business builder. And that's the kind you have with Miss Simplicity.

The housewife who possesses a Miss Simplicity is so proud of it, so pleased with the thorough way it "dollies out the dirt," that she is a live advertisement, boosting all the time, making more prospects for you to turn into customers.

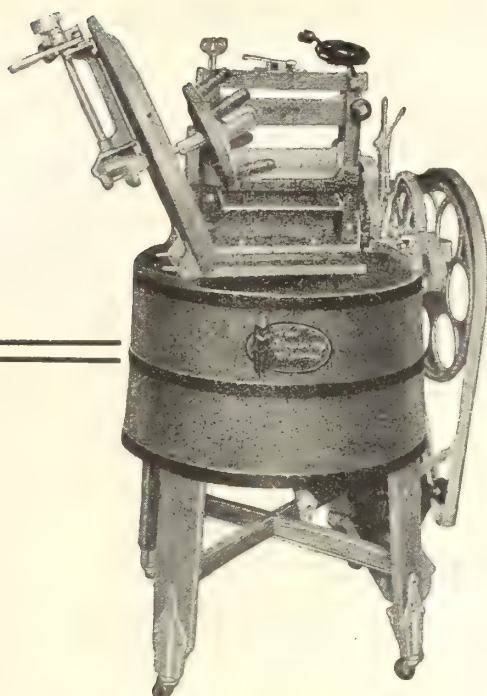
With a Miss Simplicity on display in your store you can stage a demonstration more convincing than a hundred talks; more practical and more productive of business than any number of suggestions. Prospective customers can actually test the ease and simplicity of operation and see the handsome appearance and careful workmanship of this electric clothes washer.

The selling price of Miss Simplicity is positively right—quite low and well within the reach of the average purse—yet there is a liberal profit for you every time.

And our guarantee? Why, naturally we are behind our product to the very hilt. Study the points enumerated on the opposite page and you will soon see why. You really should write for our dealer terms. We know that they will interest you as they have many others.

Our motto is "Efficient Service" and we give you a liberal guarantee that enables you in turn to guarantee perfect satisfaction to your customers. We also give prompt shipment of orders.

With your first order we will send you a supply of attractive circular folders which explain in convincing language the merits of Miss Simplicity. We will imprint your own name and address if you desire.



You Can Appreciate These Facts

Though Miss Simplicity sells at a strictly low figure, it is mechanically perfect and will not only do the work it is intended to do, but will give a lifetime service.

Put one on display in your store, try it out yourself and you will find that Miss Simplicity has all the good, mechanical features of a satisfactory electric washer. Here are ten of the features that will surely appeal to you:—

- 1—A simple screw-plug fits any ordinary lighting socket—perfect connection that will not blow a 10-ampere fuse.
- 2—All gears are machine cut or accurately moulded. Noise and friction eliminated, insuring long service and quiet running.
- 3—The self-adjusting, hardwood dolly has a patent cap that protects the clothes from any possible damage.
- 4—Large, substantial tub of first quality, Louisiana Red Cypress—"The wood eternal"—retains all the heat.
- 5—Simple belt-tightener and spring cushion for the motor. Belt trouble entirely avoided.
- 6—Very easy to move—the castors are extra large and roller-bearing.
- 7—Miss Simplicity is controlled by a single current switch. This switch and the connecting lever of the wringer are close together and within instant arm's reach.
- 8—Reversible wringer with extra long rollers of best quality rubber. A double, positive, quick-acting release prevents accident or injury to clothes.
- 9—All metal parts are aluminum painted, rust-proof.
- 10—Over-size, quarter H.P., waterproof and trouble-proof motor. Power to spare but no power wasted.

Miss Simplicity is well worthy of your interest. It is as perfect as honest Canadian effort and good Canadian capital can make it. Get our dealer offer now. We promise you the keenest prices.

W. A. KRIBS COMPANY LIMITED

Hespeler, Ontario

Great West Electric Company, Limited, Winnipeg. Western Distributors.
Northern Electric Company, Limited, Montreal, Distributors for Quebec.



Your Station is Worth About 2½ Times Its Pre-War Value

Electrical authorities tell us that it would cost about 2½ times as much to build your central station today as it would have before the war.

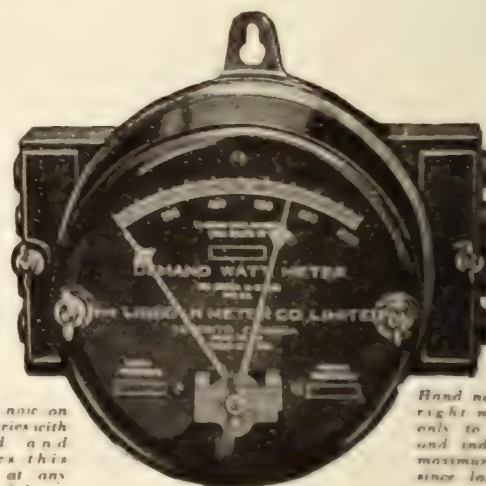
As your fixed charges are figured on plant cost, there couldn't be a more forcible argument for the necessity of measuring your customers' maximum demand.

The Lincoln Demand Meter enables you to measure maximum demand just as accurately as you now measure kw. hour consumption. Your charges are divided proportionately among your customers if you install this precise instrument. You know that you are billing each customer on a wholly measured basis, and that he is paying you for the service you are giving him.

Business methods that ensure this kind of satisfaction all around cannot be measured in dollars and cents. Good will is any firm's largest asset.

Ask us today what the Lincoln Demand Meter will do for you. Let us tell you how it accurately measures demand and eliminates every personal element in the estimating of it.

Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

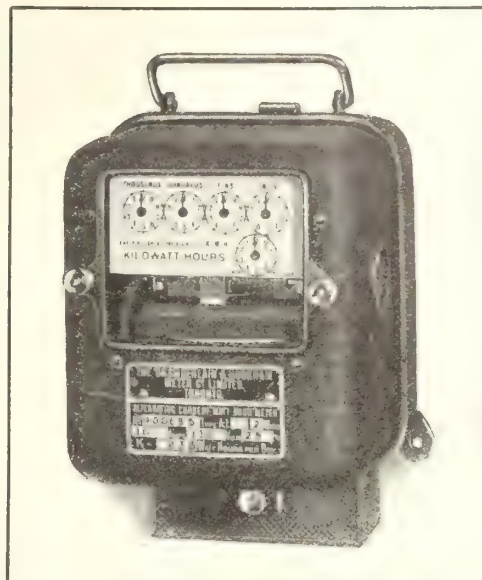
Lincoln
MAXIMUM DEMAND
meter

Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

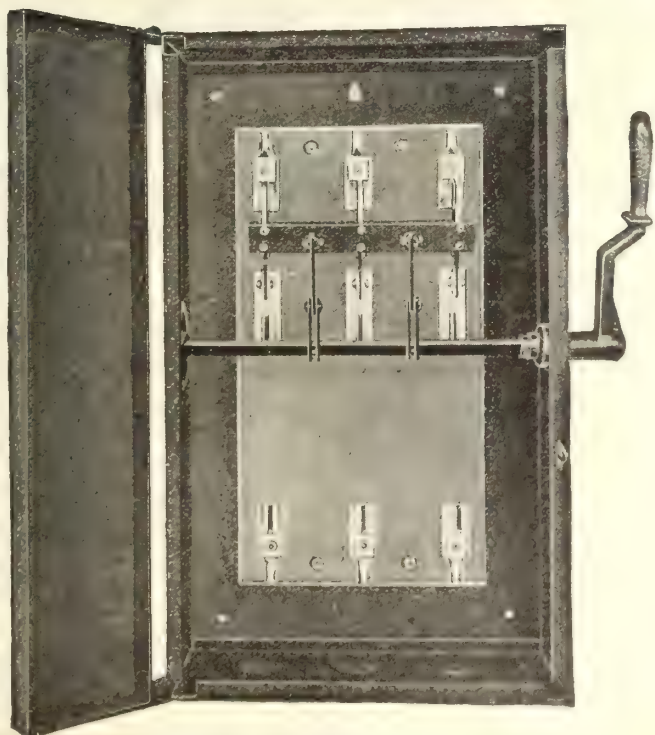
How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World



Are those Safety Switches you installed the last year or so, standing up?


WE GUARANTEE
Devoe Safety
Service Switches

Write for
Bulletin No. 19

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame St. West

Montreal, Que.



BRUSH DATA SHEET

Canadian National Carbon Co. Limited

If you will furnish us with the following data it will enable our engineers to select a brush adapted to your machine

1. Generation of current (Generator or Motor)
2. Used for (specify)
3. Direct or Alternating current
4. Manufacturer
5. Type
6. Serial Number
7. Voltage
8. Rated Capacity in Amperes
9. Maximum Load
10. Duration of maximum load
11. Average load
12. Revolutions per minute
13. Number of poles
14. Has the machine commutator
15. APPROXIMATE DIAMETER (inches)
16. Is the mica in the commutator () or ()
17. State material of brush () or ()
18. If collector rings () Is material () or ()
19. Are brushes () or ()
20. Do brushes run () or ()

Information below to be filled out by N. C. Co.

General Speed of Commutator () r.p.m.

Current Density in brushes () amp. per sq. in.

Grade Guarantee () or ()

Picking Brushes for the job

THE Columbia Data Sheet Service will assure correct brushes for each of your motors and generators. It is a service of investigation, analysis, and specification by Columbia Brush Specialists. The Columbia Pyramid Brushes they specify are guaranteed to be satisfactory.

Avail yourself of this service; fit each machine with the brush best suited for the operating conditions. The service is at your command whether you have one unit or a thousand.

Columbia Data Sheet Service
Solves Your Brush Problems

Write the address below



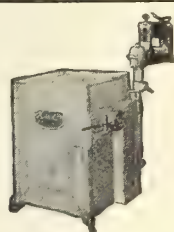
CANADIAN NATIONAL CARBON COMPANY
TORONTO **LIMITED**

A B C

The One Complete Line of Home Laundry Equipment

Built by the big and successful firm of Altorfer Bros. Company, pioneers in the industry; extensively advertised for years; distributed by leading wholesale distributors, near to you, who allot exclusive dealerships; in the A B C complete line, as a dealer you are offered the opportunity to combine shipments of assorted washers and ironers, reducing freight costs

—you have but one famous name, “A B C,” to stress and to advertise—and you enjoy exceptionally liberal discounts together with unusually broad and willing selling and advertising assistance. Write for full particulars concerning any or all of the A B C products described below.



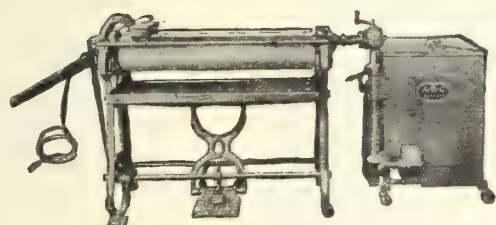
Some and lift dip

Others rock and toss

The A B C does both

A B C SUPER-ELECTRIC WASHER

Combined cylinder—vacuum—oscillating type washer. All the advantages of other washers in one for the price of one. Copper or galvanized tubs. Also equipped for power drive.

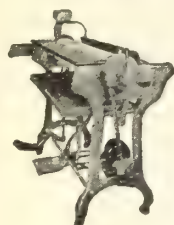


A B C ELECTRIC LAUNDRESS

Washes—Wrings—Irons—with a single motor.

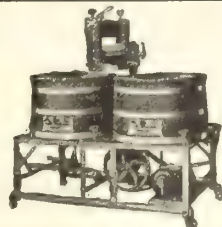
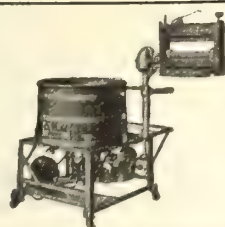
The only complete home laundry unit. Detachable wringer. Ironer shaft attaches to wringer post. Saves cost of extra motor.

The “Iron All” attachment superbly irons the difficult operations—ruffles, collars, cuffs, children’s dresses, etc.



A B C ELECTRIC IRONER

Foot pedals apply and release ironing pressure. 45-inch roll and shoe. One-piece steel ironing roll; 8-inch diameter, 7-inch non-warping ironing shoe. Result: faster, uniform work. Shoe drops back 4 inches. Enclosed parts. Independently motored—or furnished to operate off any A B C washer.



A B C “ALCO” WASHER

Dolly type. Underneath drive. Single or twin tub. Over-size motor. Machine-cut gears insure absolute quietness of operation. Also furnished for power drive off gasoline engine.

A FULL LINE UNDER ONE FAMOUS NAME—INVESTIGATE!

ALTORFER BROS. CO., Pioneer Makers of Power Washers and Ironers

C. D. HENDERSON, Canadian Representative, Box 123, BRANTFORD, ONT.

WHOLESALE DISTRIBUTORS

MARITIME PROVINCES
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Dawson & Co., Ltd., 148 McGill St., Montreal.

ONTARIO
The Central Electric Supply Co., Ltd., 36 Adelaide St. West, Toronto.
SASKATCHEWAN
Sun Electrical Supply, Ltd., Regina.

ALBERTA
Cunningham Electric Co., Ltd., Calgary.
BRITISH COLUMBIA
Rankin & Cherrell, Vancouver.

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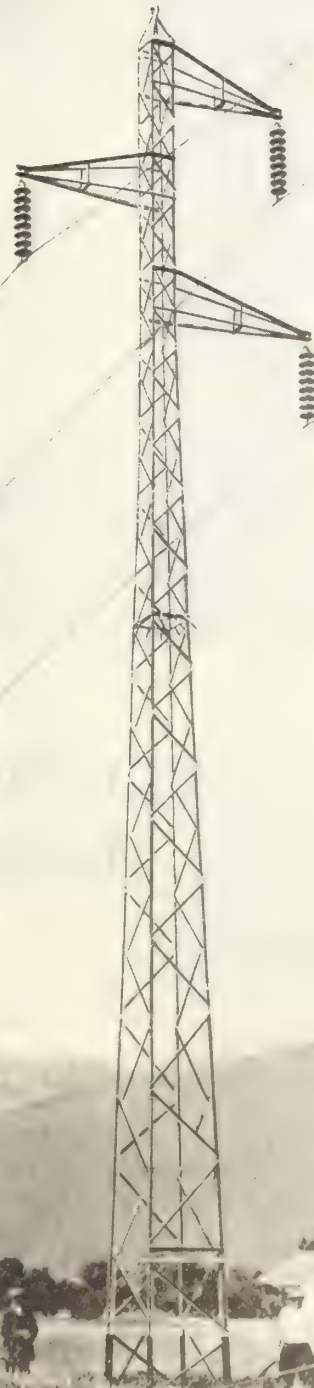
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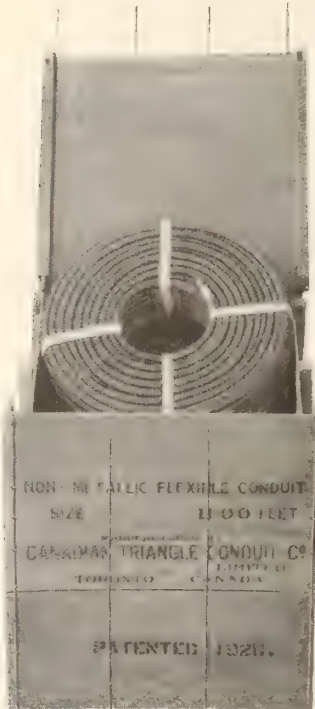
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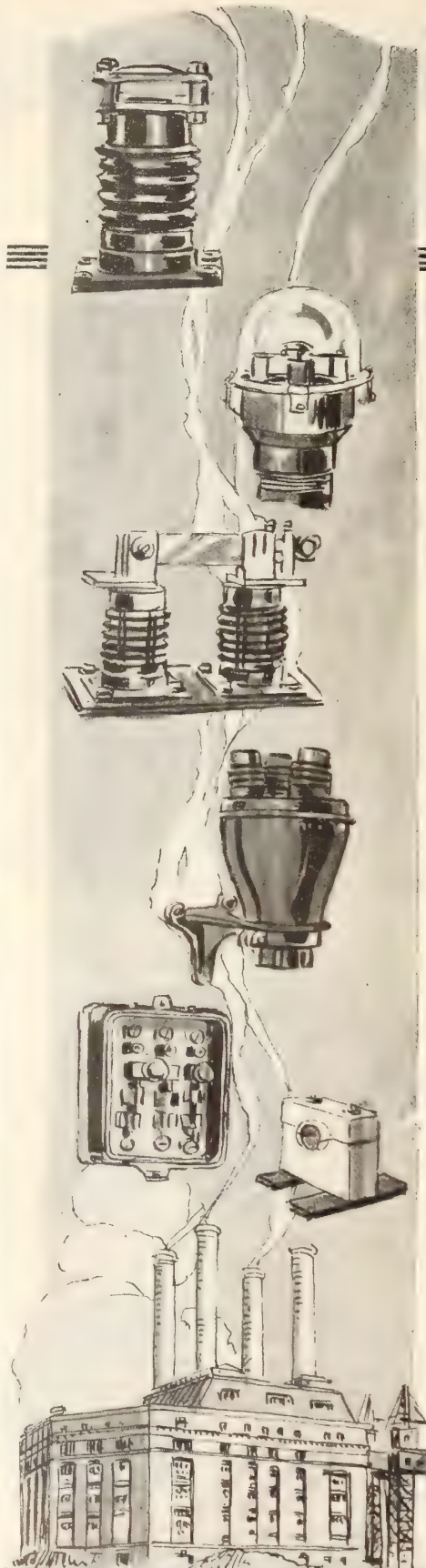
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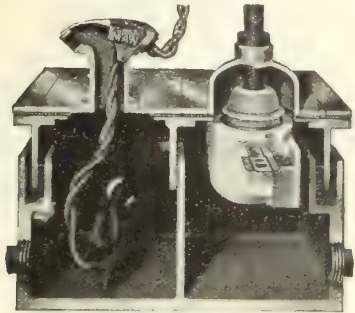
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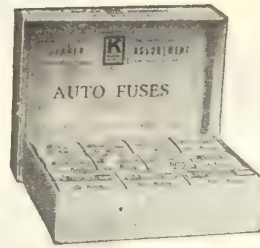
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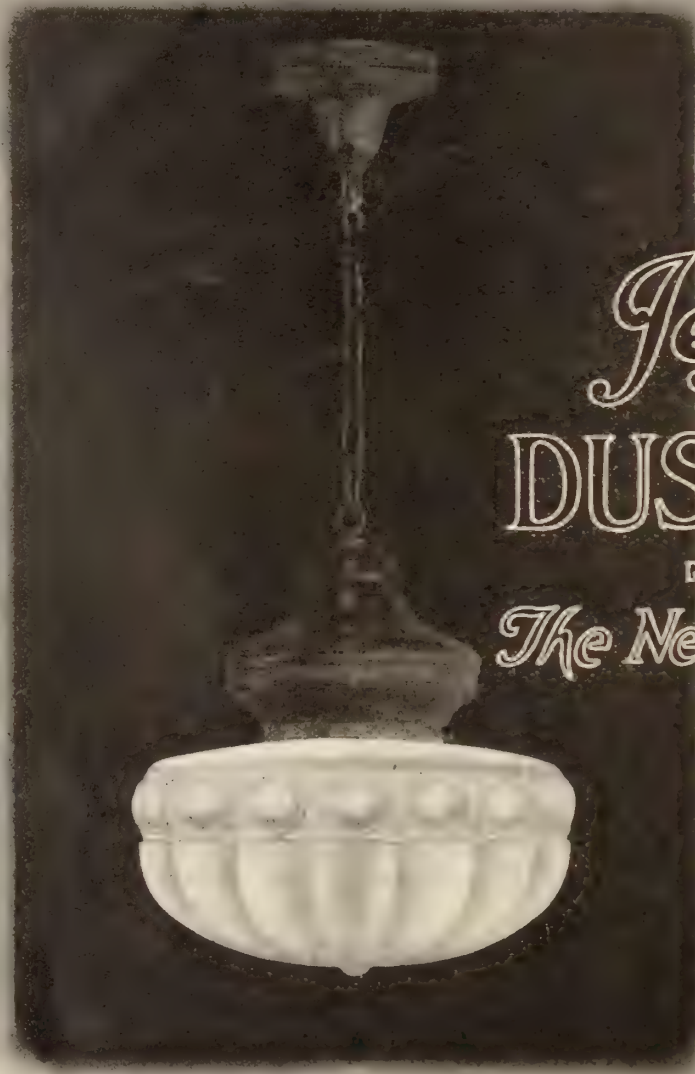
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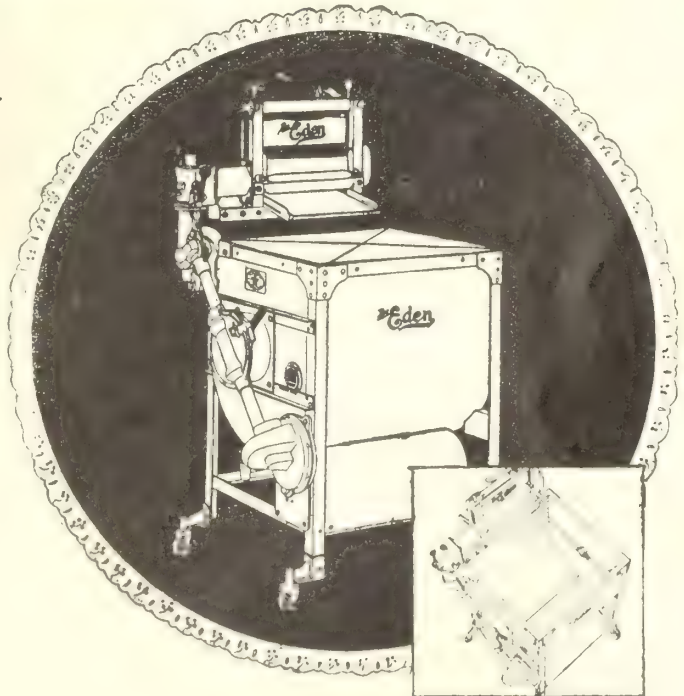
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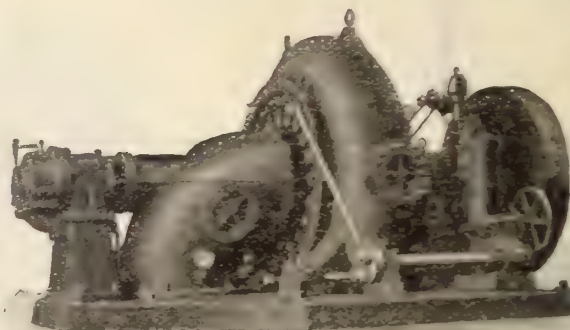
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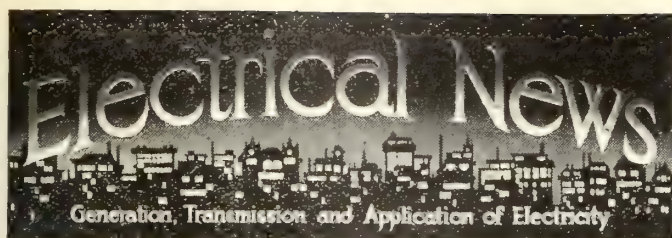
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Vol. 31

Toronto, April 15, 1921

No. 8

Committee Suggested to Study Appliance Hazard Problem

The discussion that has been running in the Electrical News during the past three months shows how difficult a problem the electric industry is faced with when we talk of removing all hazard from the use of electrical appliances in the home. It may be quite true that the use of electricity is not attended with so much danger, or so many fatalities, as is the use of gas, but this fact does not relieve us of our responsibilities. So long as there is danger, there is need for further improvement and safeguard. Electrical men will never be satisfied until the use of electric energy in the home is as safe as it is essential. Education is not enough in itself, but no one would suggest that the educational campaign must not go on—supplemented, however, by every means that the ingenuity of the engineer can devise for insuring greater safety. We must educate the public but at the same time we must try to guard the ignorant and careless individual from danger. Perhaps we can never hope to reach 100 per cent. efficiency in either direction, but we may well hope to reach a condition where the combined results will make fatalities unknown. Until that time comes we cannot rest on our oars.

Among the many valuable contributions received is a suggestion which appears elsewhere in the present issue from Mr. A. L. Mudge, well-known consulting electrical engineer. Mr. Mudge opines that the best course to pursue in working towards a solution of this problem is to find out first just what has been done in other parts of the world, co-relate

their various activities and so construct a foundation upon which further progress may be built up. To this end he suggests a working committee formed of representatives of the various electrical organizations, that is, central stations, manufacturers, engineers and contractors, to which might well be added representatives from among the architects' profession. This appeals to us as a suggestion that ought to be acted upon at once, and we should be glad to have the opinion of our readers and of executives of the different organizations mentioned or others who may be interested. Convention time is coming for many of these associations and this topic may well form the subject of discussions that could be very helpful to such a committee as suggested.

Application of Acoustical Engineering to Fog Alarm Problems

The Toronto Section of the A.I.E.E. held a regular meeting on April 8th, when Louis V. King, M.A., D.Sc., F.R.S.C., MacDonald Professor of Physics, McGill University, gave an illustrated talk on the subject, "The Application of Acoustic Engineering to Fog Alarm Problems." Dr. King opened his address by outlining the early developments in the science of fog signalling, showing the necessity for this work, and describing the best known types of apparatus which had been developed. A few interesting but not well-known laws regarding sound propagation were referred to, including the following facts:

Owing to imperfections in the medium of transmission, the law of inverse squares seldom holds with any degree of accuracy for sound waves.

The sensitivities of the eye and the ear are almost identical for similar amounts of energy. A sound wave or a light wave representing an energy value of 800 watts would be perceptible to the ear or the eye respectively at a distance of about eight miles.

A Diaphone signal, to produce 800 watts of sound energy would require an energy expenditure of about 100 horsepower.

Owing to the tendency of sound waves to "break," there is likely to be a certain distortion take place, even when a pure musical note is propagated.

Dr. King then explained that the experiments which he had performed had been made possible by the use of the "Diaphone" fog alarms, coupled with the "phonometer" as a measuring instrument. He then described in considerable detail the experiments which he had conducted at Father Point, Quebec, in connection with the fog station there, and showed by means of lantern slides, the results of his work. This work goes to show that there is yet a vast field for experiment along the lines of better sound propagation and the use of interference phenomena to cut out the wasting of sound in undesirable directions. In conclusion, the need was pointed out for men to carry this work on to a stage where its value would make it imperative that generous government assistance could be obtained.

Electrical Co-operative Association, Province of Quebec Concentrating Efforts

As their policies are gradually being more closely defined, the efforts of the Electrical Co-operative Association of the Province of Quebec are being concentrated on the constructive issues of co-operation between its composite groups and public education in the use of electricity. The officers and members look with satisfaction at the results obtained, amongst others at the question of the good relationship between the jobbers and the contractor-dealers; there is a feeling of confidence which is gradually gaining ground between these two bodies and the association has de-

vised, with the help of both groups, further means of developing this good feeling. A committee representing both the English and French sections of the contractor-dealers has been formed for the betterment of trade relations whose purpose it is to take up with the association all causes for grievance, whether affecting the individual or the contractor-dealers as a whole.

This committee consists of Messrs. J. A. Anderson, chairman; J. A. Anderson & Co.; J. N. Tremblay, electrical contractor; W. Rochon, electrical contractor; L. Marcou, Marcou & Frere; E. R. Gunn, Gunn Electric Co.; C. Thompson, Fred. Thompson Co., Ltd.; W. B. Shaw, Montreal Electric Co.

In order to facilitate the expansion of the association's principles and policies, it has been decided to print its Constitution and By-laws in pamphlet form; these will be ready for circulation within a short time.

The details in the application of the association's policies are so many and varied that the executive has decided upon the appointment of various committees in order to do this work more diligently and efficiently: Ways and Means, Publicity, Financial and Membership.

The Advisory Council held a meeting recently under the presidency of Mr. K. B. Thornton and received a report of the executive committee's activities since the previous Advisory Council meeting. This was presented by its chairman, Mr. M. K. Pike, and gave some very interesting details of the work done and the policies outlined for the future.

At the close of the meeting the president, Mr. K. B. Thornton, explained the details of Bill No. 217, passed by the last provincial legislature, respecting the electric wiring in public buildings from a safety standpoint. This legislation also covers the licensing of the electrical contracting firms and the issuance of certificates to electrical workmen. It is the consensus of opinion that this association should co-operate with the provincial government in the application of this law.

Bell Telephone Co. Employees Hold Equipment Display

The employees of the Bell Telephone Company of Canada, Montreal plant, held an equipment display for the ten days beginning March 21st, in their recreation hall. The display was a comprehensive exhibition of the apparatus and methods employed in telephone work, current being supplied to instruments, telephone and telegraph lines, etc. Each department put up its own equipment, and there were demonstrators on hand to explain the operation and installation of the various parts of this equipment.

The Commercial Department described the various steps taken when a subscriber signs a contract for service. The work of the Collection and Directory Departments was also shown.

The Installation Department displayed included various types of sub-station instruments, from the magnets to the common battery system. Private branch exchanges were shown, together with an order table. The inspectors of the Maintenance Department demonstrated.

The Construction Department featured the stringing of cables from pole to pole, the jointing of wires and cables, the anchoring of posts, etc. The telephone equipment, from the subscribers' premises to the Central office, and the trunk cables between Central offices, were reviewed by demonstrators.

The Central Office Equipment, showing terminal racks, cables, relay, etc., from underground cables through the switchboard, and the method of operation, were explained by the Traffic Department.

The Engineering Department had installed a toll equipment for a line from Montreal to Toronto, with Kingston as intermediate station, for simultaneous working of telephone,

telegraph and time service. A transmission and outside plant, showing a two-stage amplifier for a loud-speaking telephone, beside other apparatus, were also described, together with sub-station apparatus showing the pre-payment type of pay stations, also automatic switching equipment.

A small power supply plant was shown in operation. The display also included a museum of obsolete instruments and other equipment, pictures, and records, together with war souvenirs of equipment used by the Germans.

The Northern Electric Company featured the various stages in the manufacture of wire and equipment.

The Marconi Wireless Company had also arranged to give practical demonstrations of wireless telephony and telegraphy.

The lighting arrangements were carried out by the lighting department.

The hall was too small for the large number who viewed the display. The undertaking is an example of what co-operation between staff and employees can do, and the employees are to be congratulated for the success which they so well deserved. The installation of so much equipment was a considerable task.

R. T. Riley, Managing Director of the Northern Trusts Co., Addressed Manitoba Electrical Association

On Thursday the 11th of March at the annual dinner of the Manitoba Electrical Association, Mr. R. T. Riley, managing director of The Northern Trusts Company, was invited to be present, and, at the suggestion of Mr. Cochrane, answered some queries as to the cause and effect of fluctuating exchange rates, the general effect of the present large issue of paper currency and low gold reserve on business conditions: the lack of capital available for new work, etc.

Mr. Riley stated, in answer to these enquiries, that he would eliminate all technical terms, and by use of simple illustrations he would endeavor to show just what exchange was, and how its operations were conducted, which he did, commenting on the tremendous fluctuations that had resulted from the four year war, which had resulted in rates of exchange which were in many instances nothing less than tragedy.

The gold standard, he said, had been developed practically the world over for international trade, because every other standard had been found to be unsatisfactory, such as shells, skins, silver, etc. Considerable attention was given to token money and inflated currency, and their relations to the country of their origin and international trade, emphasizing that no matter what any country might think, or declare its own money to be worth, that outside its own boundaries it was the other fellow that fixed its purchasing power.

The prospects of deflation in the various countries, and the resumption of the gold standard were discussed, and it was very clearly shown that even in our own Dominion, although it was a very enviable position to be in, it was not easy of attainment. Attention was drawn to the fact that since October last there had been a deflation by the banks of Canada, to the extent of about one hundred and fifty millions, but it was estimated that another two hundred and fifty millions would be required to bring the business of the Dominion down to anything like a comfortable basis.

In closing Mr. Riley remarked:

"The things I want you to take away with you are: That exchange is a continually changing and fluctuating thing of the year the world over. That the present adverse rate of exchange between Canada and the United States is largely the price that we are paying for our extravagance, by insisting on buying what we could do without. That there is no cure for this extravagance but the same lack of common sense."

to indulge in it, and that may be brought about by the time another two hundred and fifty millions of borrowings by the people of Canada have been curtailed and we get down to a gold basis. That we should not talk so much about high priced goods, but we should talk about our money being too cheap, and below the gold standard. That the nearer we get to the gold standard the harder up we shall feel and the saner we shall be, but nowadays one cannot perform miracles and turn water into wine, or paper money into gold coins.

"Now, go away from here determined to live up to the things that you believe in. I believe that this Dominion is the premier Dominion of the British Empire; that the country West of the Great Lakes is just ripe for rapid development; that the City of Winnipeg stands as the toll gate or clearing house for all this territory and will receive tribute from all the business that is done in it, and if you want to catch any fish, this is the time to set out your lines."

Shawinigan Interests will Operate Line of Steamers

In connection with the various industries which have been established by the Shawinigan Water & Power Company and others in the St. Maurice Valley, it is proposed to run a line of steamers between Three Rivers and United States ports. An announcement to this effect has been made by Mr. J. E. Aldred, president of the Shawinigan Company. This concern, it may be recalled, has established electro-chemical plants at Shawinigan, and the idea of the steamship line is to give direct connection with the markets in the United States. Steamers plying between Three Rivers and United States ports, such as Baltimore, for example, could carry the diversified products of the district, such as pulp, paper, chemicals and so forth, directly or almost so, to their destination and return with cargoes of essential products, such as coal, sulphur and other raw materials, used in the manufacture of the Canadian commodities. Transportation costs constitute a vital element in the industrial field and we feel that these can be reduced to the advantage of the many industries which have been attracted to the province by reason of the splendid power facilities offered.

Electric Club of Toronto Hears Two Interesting Addresses

Mr. E. V. Buchanan, general manager of the Public Utilities Commission of London, addressed The Electric Club of Toronto on April 8th. He gave a very interesting talk on "Open Spaces," pointing out the importance of parks and supervised playgrounds and their effect on the well-being of the community and also alluded to the fact that where money had been spent on parks, the streets immediately adjacent to the park increased in value—in one case 700%—whereas streets not adjacent to parks in the same town had only increased 100%.

Mr. W. C. Adams, chief engineer of the Northern Electric Company, addressed the club on April 1st on "The Telephone Plant and Some Recent Developments." Mr. Adams had diagrams showing the working of a connection when one subscriber called another subscriber on a different exchange. He then compared this operation with two different forms of automatic exchanges and showed samples of the various pieces of apparatus which go into an automatic exchange. The members were very much interested in the immense complications of the system and impressed with the sound engineering which has been put into the development of making such a system practical.

Annual Report of Canadian Westinghouse Co. is Very Satisfactory

The Canadian Westinghouse Company, Ltd., have issued their 17th annual report, which covers the year ending Dec. 31, 1920. The report states that the extension of the company's business made it necessary during the year to increase the capital stock, which now stands at \$7,417,900. Net earnings for the year were \$1,251,000, or, after generous allowance for depreciation and Dominion taxes, \$916,000. The total assets of the company are placed at \$11,962,307. The following are interesting extracts from the reports, which indicate that the Westinghouse Company has been playing its part in the development of the Canadian industry:

"The period of industrial expansion which, developing during the preceding year, was in full tide at the beginning of 1920, continued with little abatement until about mid-year. By that time a realization began to make itself felt generally throughout the community that, although no overproduction of goods existed as measured by the world's needs, the question of payment for further production, particularly on the scale of prices prevailing, would have to be seriously considered for the future. A dropping off in export absorptions and the continued low exchange rate on Canadian funds were indications that could not be overlooked. The individual in his home and as well the corporation, both private and public, found it expedient to curtail their expenditures and a universal slowing down of industrial operations resulted, followed by a drooping tendency in valuations of commodities to such an extent that toward the end of the year the uncertain outlook had brought about considerable unemployment in many lines.

"The standing of your company with its efficiently equipped manufacturing organization and with its reputation for maintaining, in the design and fabrication of its products, the well-known Westinghouse standards for service, enabled it to secure such a share of the business offering that not only has the billing of shipments throughout the year marked a new high record, but also orders scheduled for delivery on into the new year, are equivalent to an average full output of the plants for several months.

"The earnings for the year have been fairly consistent with the volume of business and their attainment, has been made possible by the loyal and effective industry and co-operation of officers and employees throughout the various departments.

"Expenditures for maintenance and renewals have as usual been included in cost of product for the year, together with proper allowances for depreciated values of special equipment.

"In view of the amounts involved in inventories of raw material and products, special attention has been given to their verification in physical units and to the application of conservative values at market prices or less.

"During the year your company has extended its activities in the electrical field by taking up the manufacture of incandescent lamps. Aside from this, there have been various considerable additions to your plants and their equipment, due to the generally increased output requirements. Among the notable items of the year's output may be mentioned the world's largest hydro-electric generating unit, your company being the first entrusted with the design and manufacture of a generating unit of a capacity of 60,000 horse-power."

The Laurentide Power Company have disposed of a new issue of \$1,500,000 fifteen-year 7% general mortgage bonds to the Sun Life Assurance Company of Canada. The proceeds of this issue are to be used to finance the installation of an additional 10,000 horse power at the Grande Mere plant.

The Electrical Association of Nova Scotia Elects Officers and Anticipates Great Activities

The first annual meeting of the Electrical Association of Nova Scotia was held in the Tally-Ho Banquet Room, Halifax, on the evening of Monday, April 4th.

The primary purpose of the meeting was to receive and consider the report of a special committee on organization, which had been appointed at a previous meeting of the members of the electrical fraternity in the city of Halifax. This committee, under the chairmanship of Mr. W. Murdoch, have put in a great deal of hard work, as was shown by the completeness of the report which was presented to the meeting by Mr. J. H. Lockhart.

Mr. Lockhart explained to the meeting that the committee had prepared a complete draft of a bill to incorporate the Electrical Association of Nova Scotia, including a constitution and set of by-laws. The bill, Mr. Lockhart explained, is to be presented to the local legislature as soon as approved by the association. The reading of the report was therefore proceeded with, and was unanimously approved upon the motion of Mr. Lockhart and Mr. John S. Ackhurst of the Canadian General Electric Company.

The report of the Nominating Committee was also presented to the meeting, and was enthusiastically adopted on motion of Mr. Lockhart and Mr. Joe Fassett of the Acadia Sugar Refinery, without dissenting voice.

The officers elected were as follows:

President—W. Murdoch, manager Northern Electric Company, Limited.

Vice-president—P. R. Colpitt, city electrician Halifax, N.S.

Honorary Secretary-Treasurer—J. T. Dorey, president Dorey Electrics, Limited.

Sub-section vice-presidents—Jas. Farquhar, Farquhar Bros., Limited; C. S. Garroway, Canadian General Electric Co., Limited; W. L. Weston, Nova Scotia Tramways & Power Co., Limited; W. H. Hayes, Maritime Telegraph & Telephone Co., Limited; W. M. Godsoe, C. P. R. Telegraph Company. Member—H. E. Redmond.

In accepting the office of president, Mr. Murdoch expressed his appreciation of the confidence placed in him by the electrical fraternity of the city. He felt the greatest need of some organization of this kind in every branch of the electrical industry. There was not sufficient co-operation between different branches of the industry, and the service to the public therefore lacked in efficiency. He hoped that the association's sphere of influence would rapidly increase so as to include the other towns and cities of the province, in fact, as well as in name, because it was the aim of the association to operate not only locally but throughout the entire province, and later on to link up similar associations which might be started in the other Maritime provinces, and in the Western provinces of Canada.

Short addresses were also made by the other officers and members of the Executive Committee.

Out-of-town guests were: Mr. G. S. Martin, Eastern Manager, Supply Department, Canadian General Electric Co., Limited, Toronto; Mr. B. F. Selby, Eastern Sales Inspector, Canadian General Electric Company; and Mr. A. B. Cornwell, Eastern representative, Benjamin Electric Company, Toronto. These gentlemen responded suitably to the welcome of the chairman.

The objects of the Electrical Association of Nova Scotia are very broad and, to quote from the constitution, "any person, firm, company, association or institution engaged in the business of producing, dealing in electricity, electrical appliances, or supplies or equipment used in any such business,

or engaged in any vocation or carrying on any operations in any way connected with the use or study of electricity, shall be eligible for membership in the association."

Membership is divided into eight principal classifications: Contractor-Dealers; Jobbers; Central Stations; Telephone Companies; Telegraph and Cable Companies; Industrial Plants; Manufacturers' Agents and Representatives; Educational Institutions.

There were approximately one hundred present at the meeting, and in addition to the business which was dispatched, everyone had an exceedingly good time, a varied programme of song being sandwiched in between the different courses on the menu, and the items of business on the programme. The association expect to meet once a month or oftener as occasion may require.

Cedars Adding Two More Units

The Cedars Rapids Manufacturing and Power Company, Limited, are installing two additional units, making a total of 14. These are duplicates of the present units. Provision had been made for the additions, the construction work now in hand consisting of an extension to the power house. The new units consist of two 10,000 kv.a. 6,600 volt 3-phase, 63 cycle, main unit generators, supplied by the Canadian General Electric Company, and manufactured by the General Electric Company, at Schenectady, N.Y.; a 1,250 kv.a. 2,300 volt, 3-phase, 63 cycle exciter unit, built by the Canadian General Electric Company, at Peterborough, Ont.; two 10,000 h.p. main unit turbines and one 1,500 h.p. exciter unit turbine, to be supplied by the Dominion Engineering Works, Ltd., Lachine, P.Q. The two banks of transformers, each consisting of 3 single-phase, 6,250 kv.a. (one bank 66,000/6,600 v. and the other 60,000/12,100 v.), will be manufactured by the Canadian General Electric Company. The same company will also supply the switchboard and switching equipment.

It has been decided to build an additional transmission line from Cedars to Montreal, about 30 miles. This line, of aluminum cable steel, reinforced, will be strung on steel poles.

Two-Day Safety Convention

The second annual "Safety" Convention will be held at the King Edward Hotel, Toronto, on April 27 and 28, following the second annual meeting of the Canadian National Safety League and the seventh annual meeting of the Ontario Safety League. Six papers on various phases of accident prevention have been arranged for and should create a lively discussion. Following the business meetings in the morning, two papers will be presented on the afternoon of Wednesday, the 27th—the first on "Traffic" and the second on "How to Interest the Employee in Safety." Four papers will be given on Thursday, the 28th. These papers being "Workmen's Compensation," "Falls and Falling Objects," "Safeguarding Machinery" and "School Safety."

The Dominion Bureau of Statistics has issued a preliminary report covering the year 1919 on the electrical apparatus manufacturing industry in Canada. 95 plants are specified, of which 64 are in Ontario, 16 in Quebec and the remainder scattered throughout the other provinces. The investment in the Province of Ontario is \$23,500,000 and in the Province of Quebec \$20,000,000. The total Canadian investment is \$45,956,399. The value of goods turned out by the 95 factories in question was slightly less than \$33,000,000.

McDonald & Willson, wholesale electrical supplies, Toronto, announce that Mr. H. W. Heise has joined their sales staff and will devote his time to the wholesale trade in the city of Toronto.

Canadian Electrical Supply Manufacturers' Ass'n Discusses Inspection at Annual Meeting

The question of a uniform inspection and labelling of electrical goods by a Canadian organization was discussed at the annual meeting of the members of the Electrical Supply Manufacturers' Association held at the Windsor Hotel on March 31st. Mr. J. Herbert Hall, the president, described the question as one of the most important before the Association, as it affected every member's business.

Electrical goods and appliances are at present submitted to the Canadian Fire Underwriters' Association, and tested at the Underwriters' Laboratories, Chicago, or in the Province of Ontario are passed upon by the Hydro-electric Power Commission. Recently the Underwriters' Laboratories of Canada, Limited, was incorporated. Mr. G. B. Muldaur, the general agent of both Underwriters' laboratories, was the chief speaker at the meeting. He explained that he had come from Chicago to receive the suggestions of Canadian organizations and manufacturers as to the best methods of starting the active work of the Canadian Underwriters' Laboratories. The Canadian institution was connected with the Chicago Laboratories, and any committee appointed would be able to confer with the Chicago Laboratories. The replies to communications with Canadian companies and firms had been uniformly favourable to a Canadian organization. Such an organization would do away with any feeling that existed among Canadian firms, and more especially among British firms, against having to deal with a non-Canadian organization. The organization would obviate any friction. There was not sufficient business in Canada to warrant the establishment of a laboratory, but arrangements could be made to send the goods to Chicago for the preliminary investigation or for some laboratory in Canada to do the examination. The directors of the Canadian Laboratories are composed of one representative from each of a dozen U. S. companies and three British companies.

With regard to the Ontario Hydro-electric Commission, Mr. Muldaur explained that there had been certain negotiations which had proceeded very smoothly. The speaker then outlined a suggested basis of agreement, in order to secure a uniform inspection throughout Canada. They had received, he said, cordial offers of co-operation from the Ontario Commission with regard to adopting a satisfactory working arrangement in the Province of Ontario. At present there existed in Ontario arrangements by which the Hydro accepted the tests of the Underwriters' Laboratories on the payment of a nominal fee for promulgation of its tests on cards distributed in interested quarters. In order to prevent duplication it had been suggested that tests of articles submitted to the Underwriters' Laboratories of Canada might be made in the laboratories of the Hydro Commission jointly with engineers of the Underwriters' Laboratories of Canada and that reciprocal arrangements be made on the councils and approved committees of both organizations. It was understood that plans are in progress for the enlargement of the council's committee of the Underwriters' Laboratories, so as to include representatives from all the provinces and that some re-organization might be made in the approvals committee of the Hydro Commission. Mr. Muldaur also pointed out that the Chicago laboratories had no legal status and had been built up on the confidence of the public. He was anxious to secure advice as to any future policy which might be followed, and emphasized the point that the new organization was Canadian and for Canadian trade. The Canadian Laboratories had received the assurance of co-operation from the Canadian Manufacturers' Association and also the approval of the Canadian Electrical Association.

Considerable discussion followed Mr. Muldaur's address, several points as to the proposed work of the Canadian Laboratories being referred to. A member alluded to the difficulties caused by a duplication of inspection. For instance, goods approved in Ontario might not pass in Winnipeg, so that two types had to be made. Manufacturers desired to standardize their products—if they could not they might as well go out of business. A Canadian organization must adopt a universal code, and must secure the co-operation of all provinces.

Mr. Muldaur said it was clear that an arrangement must be made with the Ontario Hydro Commission or there must be a separate organization. He explained briefly the working of the Chicago Laboratories, stating that there were no stockholders, nor were any dividends paid.

A member pointed out that if each province required a label it would mean that the manufacturers would have to carry heavy stocks. The only policy was to standardize the goods.

What was wanted was a uniform inspection so that goods once approved should be accepted in any part of Canada. Mr. Muldaur's object was to arrange a working agreement with the Hydro Commission so that what was passed in Chicago would be accepted in Ontario.

It was the opinion of the meeting that the association should go on record as approving of the movement to secure co-operation between the different organizations with a view to obtaining uniform inspection and labelling. Mr. Muldaur said it was an absurd condition that goods had to be earmarked in different parts of Canada. The practice of double inspection should be abolished.

A member referred to the difficulty of getting certain goods bearing the Hydro label passed in Winnipeg, but another member explained that this was due to the differences in the rules governing the use of goods.

In reply to questions, Mr. Muldaur stated that the Underwriters' Laboratories did not accept Hydro inspection, preferring to make their own. The president supplemented this by saying that the Underwriters' inspection was accepted in Canada, with the exception of Ontario and there the Hydro Commission passed the Underwriters' inspection on payment of \$10.00.

A member intimated that there was a probability of an inspection bureau being established in the Province of Quebec.

A member suggested that, as the Hydro Commission accepted the rulings of the Underwriters' Laboratories, the latter should reciprocate and accept the rulings of the Hydro Commission. Mr. Muldaur replied that the goods were in fact submitted to the Fire Underwriters, and they had them tested where they liked. As to a reciprocal arrangement, he pointed out that the Hydro inspection was not acceptable throughout Canada and instanced Winnipeg in this connection. A member rejoined that the Hydro standards were based on those of Chicago. Another member supported a Dominion-wide inspection.

After further discussion a committee was appointed to draw up a resolution approving of a Canadian Fire Underwriters' Association, and of the movement in favor of a uniform inspection and label.

The Montreal Administrative Commission will oppose a bill now before Parliament by which the Quebec Union Electric Telephone Company is seeking for authority to exploit a telephone system in sections of Canada east of Ontario. As this district would include Montreal, the city commissioners take the stand that a second telephone company in Montreal is not desirable, as it would mean that subscribers would have to pay for two telephones instead of one.

Nipigon Power Development of the Ontario Hydro Commission

Twenty-Five Thousand Horsepower Now Available to be Increased to Three Times that Amount as Demand Develops—Transmission at 110,000 Volts

By T. C. JAMES

Assistant Engineer, Hydro-electric Power Commission of Ontario

The Nipigon development was undertaken by the Hydro-electric Power Commission of Ontario to supply the power requirements of Thunder Bay District in general and the cities of Port Arthur and Fort William in particular, and based on the existing demands of industries negotiating for service, the efforts of the Commission on behalf of this district have been amply justified.

The capacity of the initial installation—25,000 horsepower—will be completely utilized in about one year's time, whereas, negotiations with new industries indicate the utilization of the ultimate capacity of 75,000 horsepower as fast as the equipment can be manufactured and installed.

The location of this development is at Cameron's Falls on the Nipigon River which flows out of Lake Nipigon into Lake Superior. There are several sites on this stream which provide excellent facilities for a power development scheme and all will be eventually made use of as the occasion demands. The Cameron Falls location was chosen by the Commission as being the most suitable for the initial requirements of the district to be served, having in mind the cost of power during the period in which the market was being firmly established. The accompanying map, Fig. 1, illustrates clearly the power possibilities of this stream.

A larger development than the one decided upon could have been located at or near Alexander Landing, by utilizing the combined head of both Cameron's Falls and the rapids below them. Such a development, however, although capable of greater capacity, would require a much greater capital expenditure and would have necessitated a greater cost per horsepower at the market, during the period taken to build up a load equal to the ultimate capacity of the plant. The map of the district previously referred to indicates the possible locations of future developments on the Nipigon River and it is the intention of the Commission to develop the entire potentiality of the stream as fast as the power requirements of the district warrant such extensions to the existing scheme.

Ideal Storage

Lake Nipigon, with an area of 1,500 square miles, affords an ideal storage basin for power development on the Nipigon River. The elevation of this lake is 852 feet above mean tide water level, whereas the elevation of the Nipigon River at Lake Superior is 602 feet, making the total fall in the river, between the two lakes, 250 feet. The total drainage area of the river, including Lake Nipigon, is 9,100 square miles and the maximum stream flow approximates 3,600 c.f.s. without regulation. With regulation on Lake Nipigon, however, 5,800 c.f.s. is obtainable under a 75 per cent. load-factor operation. The total potentiality of the stream varies from 100,000 to 200,000 horsepower according to load-factor.

Due to the location of the development considerable work of a preliminary nature was found necessary before

proceeding with the construction of permanent works, such as the construction of a temporary power plant, one mile of railway siding (standard gauge), including a bridge across the river, as well as various camp buildings and cottages for the purpose of providing living quarters for the staff and

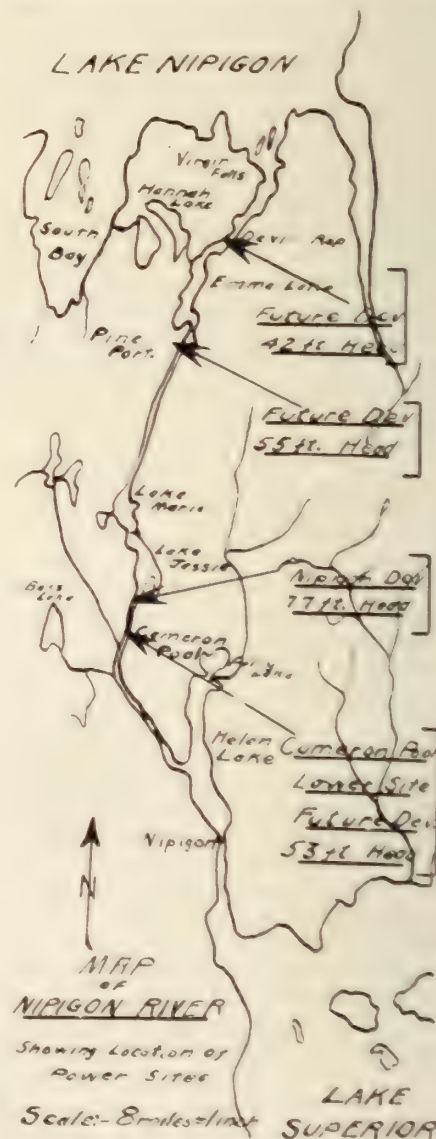


Fig. 1—Power sites on Nipigon River.

the workmen. The temporary power plant consisted of two turbines obtained from the old Otanabee plant near Peterborough, which were utilized to drive one 50 kw. generator and three Ingersoll compressors of 200 horsepower each.

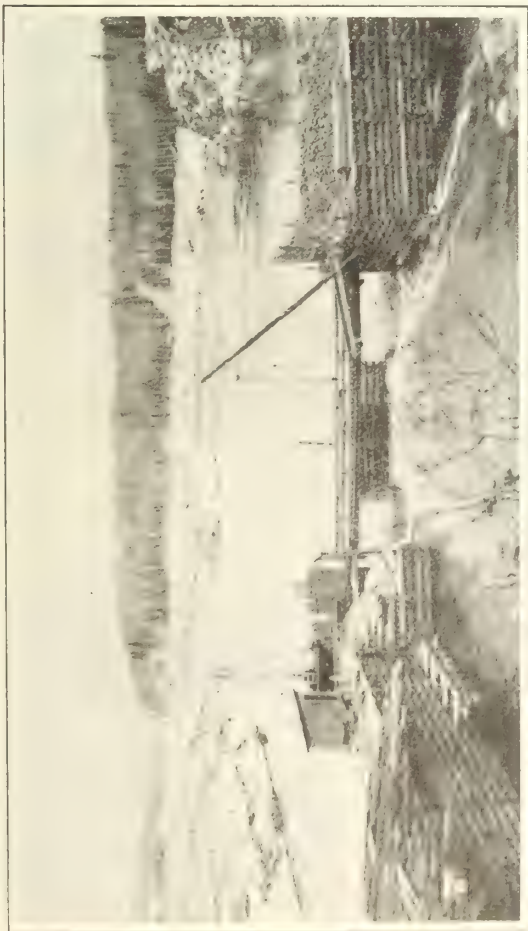


Fig. 2—Temporary crib coffer dam in process of construction



Fig. 4—Temporary crib coffer dam, completed and in operation

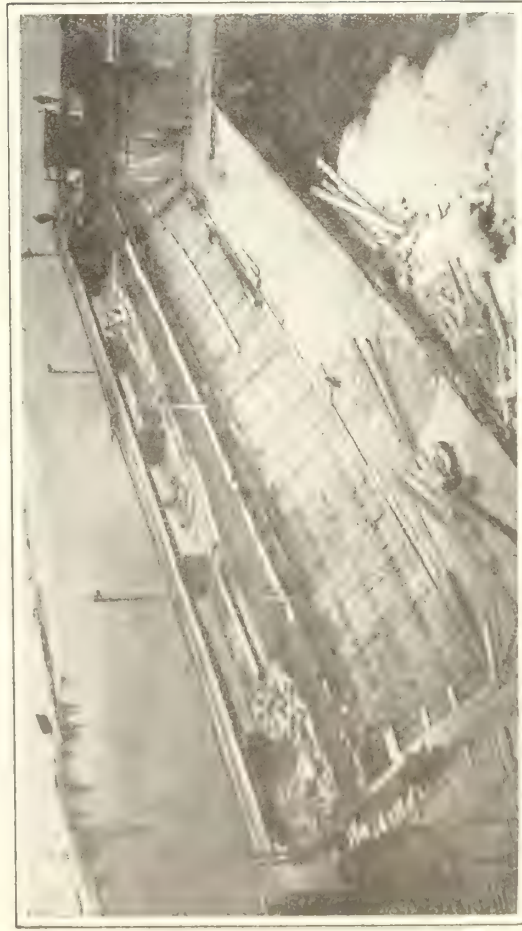


Fig. 3—Temporary crib coffer dam in process of construction.

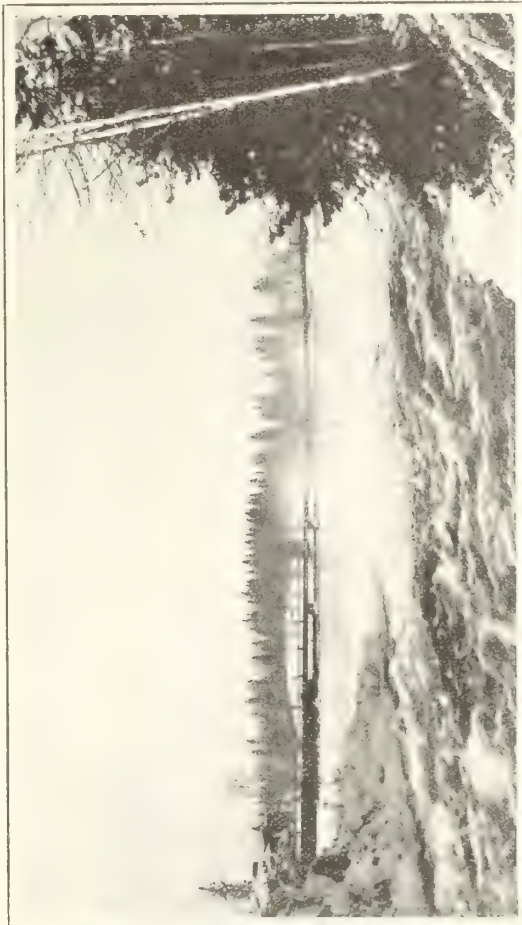


Fig. 5—Temporary crib coffer dam, completed and in operation

The electric generator provided energy for lighting camp buildings and operating motor driven pumps, whereas the compressors supplied air for operating rock drills. The temporary power house building consisted of a concrete substructure with frame superstructure. Water was supplied to the turbines through a timber flume 200 feet in length with the intake end submerged directly in the rapids of the river. To avoid ice trouble, considerable of which was experienced

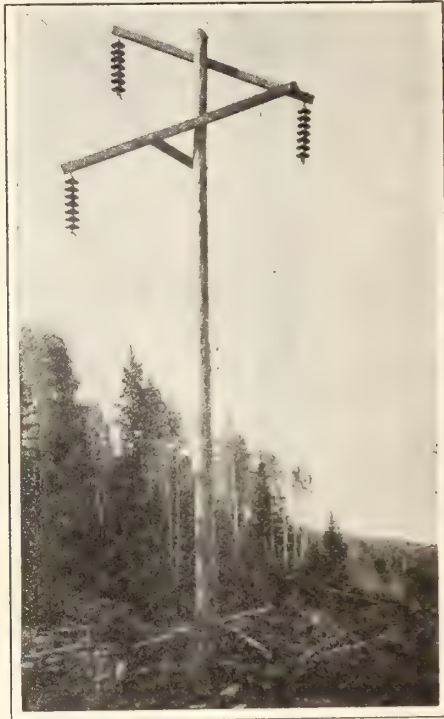


Fig. 6—Standard wishbone construction, Nipigon transmission line, looking north about three miles to power house (ground wire not placed).

during the first few months of operation, this flume was covered with tarpaulin, and in addition to this protection, live steam was introduced at the intake end, all of which was found to give satisfactory results.

The additional construction plant consisted of two steam shovels, one No. 60 of $2\frac{1}{2}$ yards capacity, and one No. 50 of 2 yards capacity, together with one Browning locomotive crane, five locomotives, four dump cars and five derricks.

A concrete mixing plant has been constructed which con-

sists of two $\frac{3}{4}$ -yard mixers with bins above for rock and sand, an elevator for carrying cement to the mixers and a derrick for loading bins. The mixing plant is also equipped with an Insley steel tower, 150 feet in length, with steel chutes. A second mixing plant similar to the one already described is being installed at the northwest corner of the powerhouse site. These two mixing plants will take care of all of the concrete work of the forebay, gate house, wing walls and powerhouse.

A crushing plant has also been constructed with a capacity of 200 tons per day, with the necessary elevator to a screening and washing plant. Arrangements are being made for the erection of a second washing plant, which will be placed at the rock pile in the dump.

The temporary construction plant was also equipped with a machine shop, carpenter shop, car repair shop and grain house.

The camp buildings are very complete, being equipped with electric lights, steam heating and a bath-house including showers. A hospital with a resident doctor also constitutes part of the camp accommodation, and a private telephone system has been installed connecting all portions of the work. A private telephone line has also been constructed connecting the camp buildings with the village of Nipigon.

The approximate cost of the temporary power plant was \$46,000, whereas the machinery which has been installed and is being used for construction purposes, represents an outlay of \$18,000. The cost of the railway from the main line of the Canadian Northern Railway to the camp site was \$31,000, and the cost of the railway bridge across the river approximately \$24,000.

Solid Concrete Dam

The dam for this development is located at the head of the rapids above Cameron's Pool, and when completed will consist of solid concrete with rollways and stop logs in the centre section and wing walls on either side, the length being 300 feet and the total height 60 feet at the maximum section.

The total amount of concrete required for the dam approximates 15,000 cubic yards. In addition to the main dam five additional dams are required, as the water of the river will be backed up as far as Pine Portage to obtain a working head of 77 feet at the development.

The illustrations in Figs. 2, 3, 4 and 5, feature the crib coffer dam at various stages of construction. This coffer dam at the present time is being used for operating purposes pending the completion of the permanent concrete dam just described. The temporary dam enables the plant to operate under a head of 60 feet, which somewhat limits the capacity

of the installed equipment, but as the market does not require the full capacity of the initial installation until Sep-



Fig. 7—Cameron's Falls, showing temporary power development, used for construction purposes only.



Fig. 8—Cameron's Pool, showing flume of temporary development.

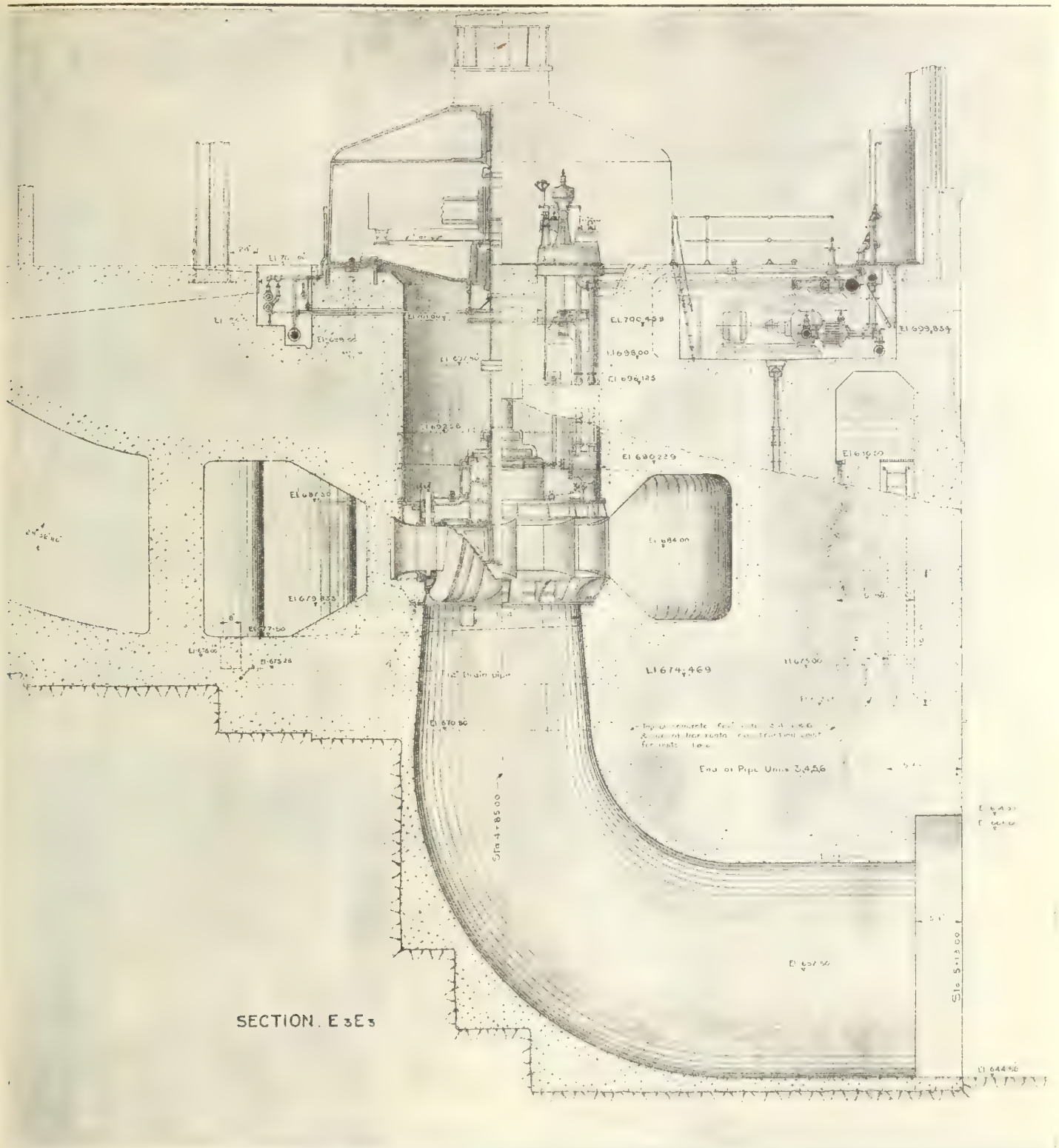


Fig. 10—Section through generator, turbine, draft tube, etc., Nipigon Development.

tember or October, 1921, ample time is afforded to complete the main dam by that time.

Plan of Power House Equipment

The forebay occupies an opening in the natural rock walls of the stream and is approximately 300 feet in length and 250 feet in width. The screenhouse, water supply pipes, powerhouse and transformer house all form one complete concrete structure between the forebay and the tail race. The general plan and cross section of power house sub-structure (Fig. 10), clearly indicates the arrangement of the hydraulic equipment. The water is delivered to the turbine through supply pipes of concrete construction passing from screenhouse to power house beneath the floor of the transformer

room. These supply pipes are grouped three to each unit. They are approximately 50 feet in length and 13 by 10 feet in cross section.

The head water is controlled by steel sluice gates placed at the entrance of each supply pipe immediately behind the racks or screens, with stop logs across the entrance of each bay immediately in front of the screens, the stop logs being provided for emergency purposes and for effecting repairs. The steel sluice gates are all operated from a common line shaft, motor driven, and the stop logs are handled by an electrically operated travelling crane.

Very little ice trouble is anticipated at this plant due to the fact that still water conditions prevail for 15 miles up

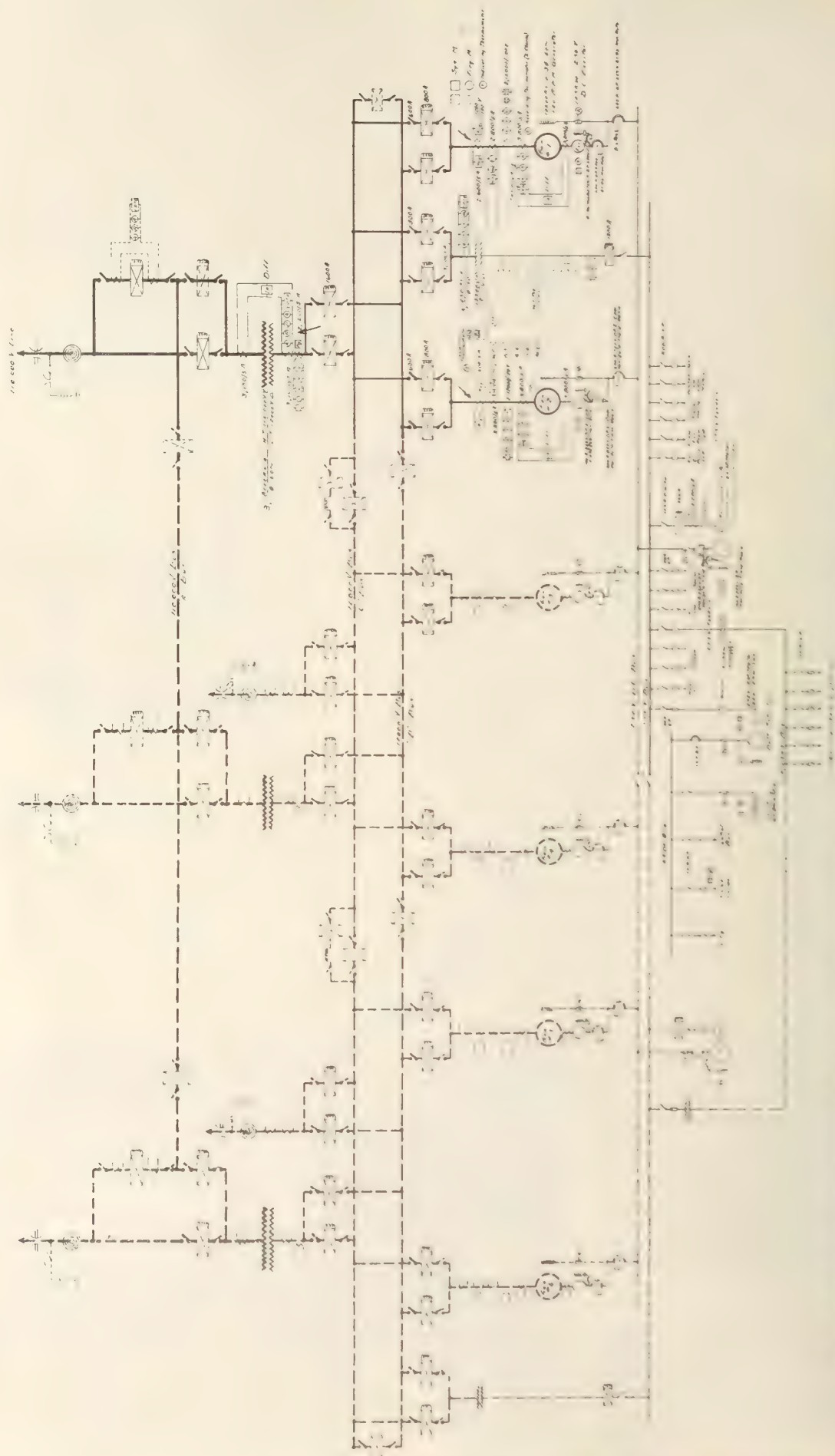


Fig 11—Single line wiring diagram of the transmission, transforming and switching equipment of the Nipigon development of the Hydro-electric Power Commission of Ontario.

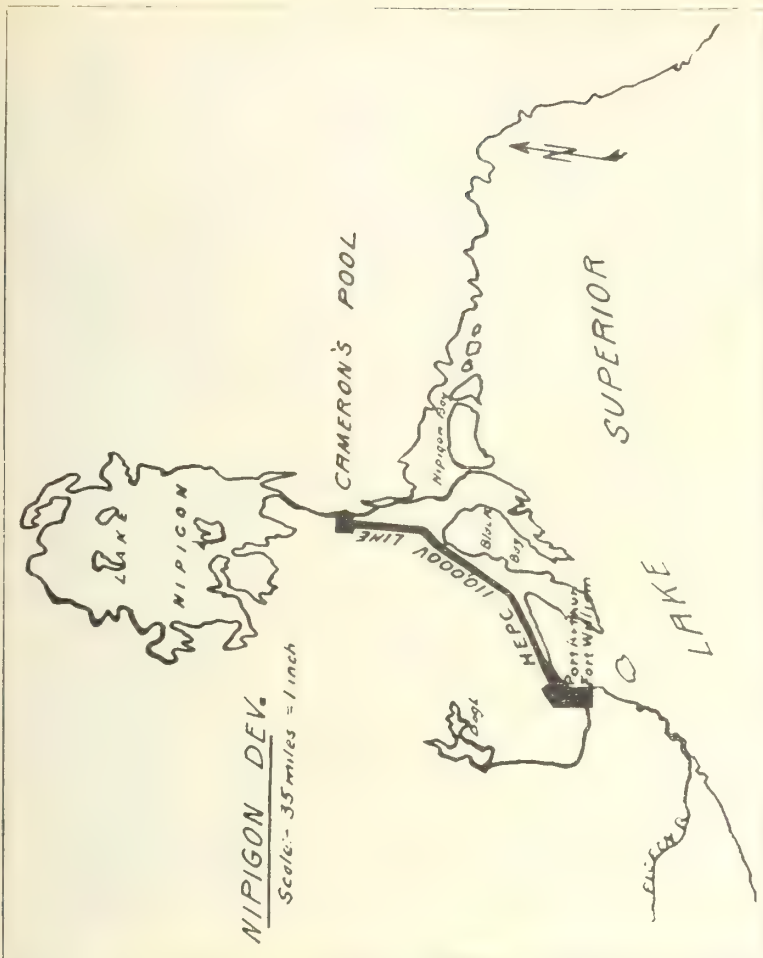


Fig. 15—Showing location of transmission line.



Fig. 16—Forebay and Head Works, December 6, 1920.



Fig. 13—Cameron's Falls, Nipigon River.

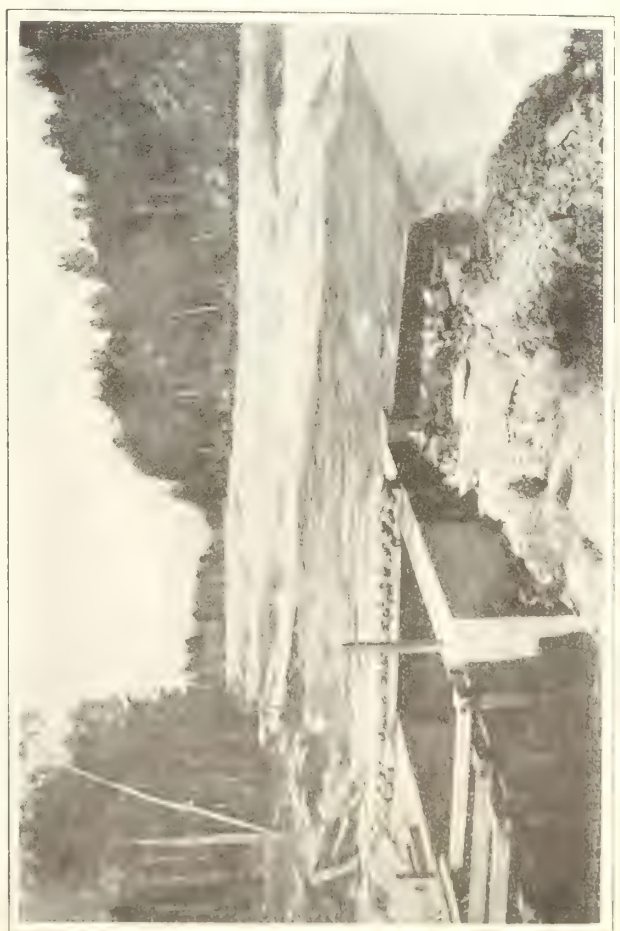


Fig. 14—Cameron Falls, showing intake of temporary development.



Fig. 19—General view of power house, November 25, 1920.

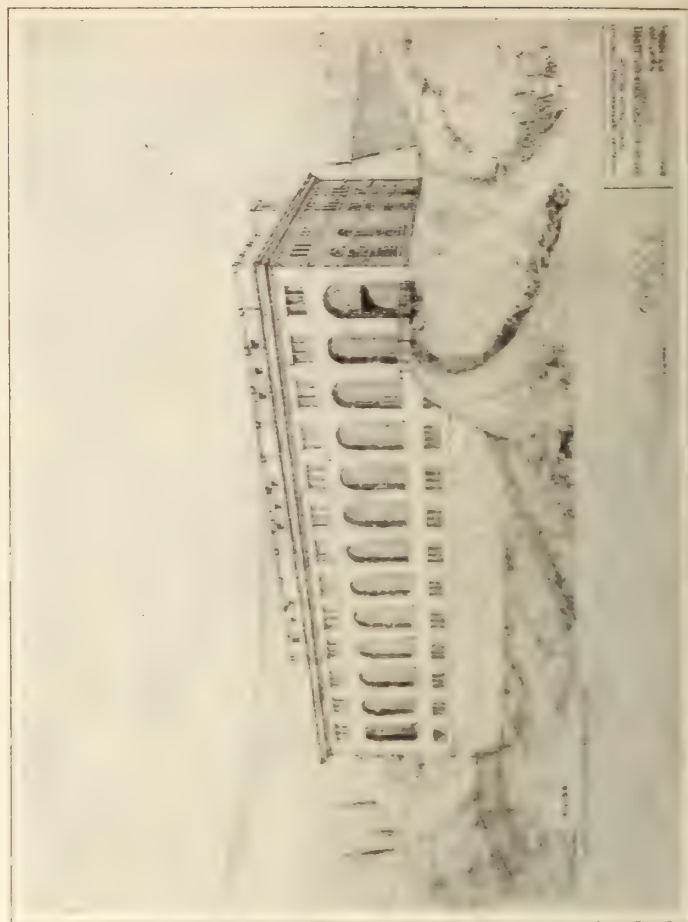


Fig. 20—Nipigon development power house as it will appear when finally completed.



Fig. 17—Power house and head works, September 17, 1920.



Fig. 18—Power house from tail race, October 16, 1920.

stream above the dam, thus preventing the formation of frazil ice.

Turbines and Generators

The turbines were manufactured and installed by the I. P. Morris Company, of Philadelphia, Pa., and are rated at 12,500 horsepower each at 72 feet head, 120 r.p.m. They are vertical type, single runner, with concrete scroll cases, the latter being among the largest ever constructed for this head. The governors are also I. P. Morris type with one central pumping plant for controlling the pressure fluid.

The generators are rated at 10,600 kv.a., at 80 per cent. power-factor, their other characteristics being 60 cycles, 3-phase, 12,000 volts. Each generator unit is provided with a direct connected 125 kw., 250 volt exciter, whereas, a spare motor generator exciter set is provided for emergency purposes. This spare set consists of a 3-phase, 185 horsepower, 550 volt squirrel cage induction motor, driving a 125 kw., d.c. generator. The first two main generator units were furnished and installed by the Canadian Westinghouse Company, but contracts for additional units have not yet been awarded.

The transformers, the first bank of which were furnished by the Canadian General Electric Company, and installed by the Commission's Construction Department, consist of 8,000 kv.a. units, water cooled, oil insulated, 24,000 kv.a. to each bank; primary voltage, 12,000; secondary voltage, 63,500 at full load, 80 per cent. power factor; connection "Y" to give a transmission voltage of 110,000.

The design of the electrical equipment of the development provides for six generators and three banks of transformers as the ultimate capacity of the plant, so arranged that two generators and one bank of transformers constitute a group unit to which is assigned one transmission circuit to deliver the energy generated to the market. Thus, taking the capacity of each generating unit as the rated capacity of the turbines the total development will be 75,000 horsepower divided into three sections of 25,000 horsepower, each section with two generators, a bank of transformers and a transmission circuit capable of being operated separately and distinct from the other section, or in parallel, as desired to suit operating conditions.

Wiring Diagram

The single line wiring diagram, Fig. 11, clearly illustrates this arrangement of generating units, buses and transformers. There are two oil circuit breakers provided for each generating unit located between the same and each of the low tension buses. Each bank of transformers is provided with two oil circuit breakers on both low and high tension sides, to permit connection to either of the low tension buses, as well as connection to the high tension bus, or, direct to line, as desired. An additional oil breaker is provided for each transmission line to permit same being fed from the high tension bus independent of its own transformer bank. Provision is also made for two transmission circuits at generated voltage fed off the low tension buses, as desired, and two feeders for station service supply energy to two banks of three 250 kv.a. transformers, 12,000 to 550 volts.

The generator and low tension transformer breakers are "Westinghouse" C-3 Reactor Type, Westinghouse type C.O. differential relays being provided for tripping the former, and both differential and overload C.O. relays for tripping the latter. Overload relays are provided in the generator circuit which ring an alarm bell only, but do not act on the circuit breakers. Westinghouse type G.A. breakers are provided for outgoing transmission lines on the high tension side, equipped for tripping purposes, with both C.O. overload and differential relays, except the breaker, which feeds the line direct from the bus, in which case overload relays only are provided.

The low tension bus tie and bus sectionalizing switches

are non-automatic, Westinghouse type C.3, and are so arranged, as illustrated in the diagram in Fig. 11, to provide an operating and an emergency bus. An additional bus tie switch equipped with a reactance is provided in the former, in such a manner that the reactance and switch can be cut out of circuit without interrupting service.

The first transmission line between the development and the Twin Cities, a distance of 68 miles, consists of a single 3-phase circuit of No. 4/0 steel reinforced aluminum carried on 45-foot Western Cedar Poles, spaced approximately 325 feet apart and erected on a private right-of-way throughout. The details of a standard pole of this line are shown in Fig. 6. The crossarms are of British Columbia fir, and the insulators "suspension" type of seven sections, each section designed to withstand a puncture test of 170,000 volts, and a flashover test of 85,000 volts, whereas, the flashover test of the assembled units is 300,000 volts wet and 400,000 volts dry. The entire line is designed for operation at 110,000 volts between phases—63,500 volts to ground.

The location of the development with respect to the Twin Cities and the route of the transmission line is illustrated by the plan of the district shown in Fig. 15. The transmission line on leaving the power house follows a cross country route of south-westerly direction until it strikes the main transcontinental line of the Canadian Pacific Railway near Sprucewood from which point it parallels the railway tracks for about 16 miles, crossing same at Ouimet, and continues south to the Canadian National Railway transcontinental line and from thence follows the latter into Port Arthur. It was found necessary to clear practically the entire right-of-way from the development to Port Arthur, the width of the clearing varying from 80 to 100 feet. Brush was found in most sections but very heavy timber was encountered from Sprucewood north. Eventually, two more circuits will be constructed, probably on steel towers, and the route for same from the development to Sprucewood has been laid out in a somewhat different direction so as to form a loop line through Nipigon village, the idea being to separate the two lines by a wide stretch of country with the river between and thus eliminate the danger of interruption to both circuits from forest fires, on that portion of the route which is less accessible than the section near Port Arthur. The Ontario Government proposes to construct a colonization road on this transmission line right-of-way from Port Arthur to Nipigon, which, when completed, will greatly facilitate patrolling. About twelve miles of this road have already been finished and opened for traffic.

The construction work at the development was begun by the Commission during the month of December, 1918, and the first unit was placed in operation exactly two years later, viz., December, 1920. The construction of the transmission line was begun in March, 1919, and the greater part of the work was completed by September, 1920.

Electric Bake Ovens

The Westinghouse Elec. & Mfg., Co., has just issued Leaflet 3436 which describes and illustrates the automatic electric ovens for commercial baking of pies, bread, cakes and pastry. This leaflet is printed in two colors and gives in detail the construction and advantages of the use of electric ovens. A discussion is also given on the use of the oven in public bakeries, hotels, meat and packing plants, restaurants, public institutions, such as hospitals, large industrial plants and private plants.

The Harvey Hubbell Company of Canada, Toronto, Ont., are distributing a folder on illumination, pointing out particularly the advantages of the proper type of reflectors.

Manitoba Power Commission Makes First Annual Report

The Manitoba Power Commission, which was brought into being at the 1919 session of the legislature, has issued its first annual report, the figures quoted covering all the work of the commission from the start to November 30th, 1920.

The reception of the commission by the rural districts of the province, as well as by the towns and villages, has been such as to exceed all expectations. The commissioner reports a constant stream in increasing numbers of applicants for information and services, and he apprehends that the difficulty for the future will largely be, not to find ways and means of extending the services, but rather to curb and control the number of applicants for services within reasonable bounds in order not to consume at the start too much capital which at present is difficult to find and abnormally expensive.

As an indication of the feeling of the province with reference to the work of the commission, the following schedule of elections is submitted, these having been held under the provisions of the Power Act:

Vote	Municipality	Total	For	Against
June 26, 1919	Portage la Prairie	463	459	4
July 20, 1920	Virden	256	220	36
Aug. 14, 1920	Minnedosa	179	166	13
Oct. 19, 1920	Carman	142	142	
Nov. 10, 1920	Roland	113	107	6
Nov. 26, 1920	Morden	165	163	2

It will be noted that the total votes record show less than 5 per cent. (to be exact, 4.6 per cent.) against the by-law.

The commissioner reports in high terms of the engineering, construction and accounting staffs of the commission, and he points out that there have been no changes in the personnel of the staff, which is the best indication of the satisfactory nature of their work. He makes special reference to the devotion of the staff during the very trying period in March, 1920, when an unprecedented storm wrecked the transmission line to Portage la Prairie before work had proceeded to a point where the line could reasonably have been expected to withstand the strain to which it was subjected in the storm. Every man, without exception, worked to the limit of his ability under weather conditions which, for hardship and trial, are not to be equalled in the records of the province and he declared that the thanks of the community is surely due to these men for their work at that time.

Financial

The financial statement which accompanies the report of the chief engineer shows a budget, for the period ending November 30th, 1920, of \$886,463.56, in which is included a stock statement of \$236,161.64. The accounts of the commission are regularly audited by the comptroller-general's department, and upon inspection will be found full and complete, and to balance in every particular.

The principle upon which the commission carries out its work has been, from the start, that all fixed sums charged against capital expenditure are to be distributed and returned to the commission by the municipalities with whom contracts are made. These fixed charges have been divided under the heads of interest, depreciation, maintenance and operation, and each item has been so allocated that ample returns are assured for the discharge of every obligation. In addition to this, it has been assumed that the municipalities are to be regarded, and to regard themselves, as being partners in all the work of the commission, and are to be responsible for the financial returns which the work requires; their function in the work to be the making of individual contracts or sales within their own boundaries, at rates to be decided upon by themselves, and to make collection of the sums so arrived at,

the balance to be transmitted to the commission as arranged for by contract. The municipalities have accepted this attitude of the commission without exception, and are working with the commission in the co-ordination which such acceptance implies.

In allocating charges to municipalities, it is attempted to provide that from the beginning each section of any outlay will return to the commission all the sums necessary. This means a rather heavy charge at the start on those municipalities which were the first to enter into contracts, but it will be found, as time goes on, that the increase in the number of connections or services to the line, or lines, constructed will have the effect of lowering these fixed charges, as every new participant in the service will take its share of the fixed capital charges, thus lowering the burden all around.

In the reconstruction of the line to Portage la Prairie made necessary as a result of the storm disaster in March, 1920, new factors of design were introduced into the construction, and were treated as capital expenditures. These take the form of concrete footings throughout the whole length of the line, and new steel corner towers. These items taken together make a total cost of \$31,079.55. In the statement of accounts there is an amount, as set opposite Portage la Prairie transmission line, of \$322,718.20, which sum is in excess of the original cost for this line by \$47,689.08; deducting from this amount the combined cost of the concrete footings and the new corner towers (\$31,079.55) we have a difference of \$16,809.53, which is the figure representing the cost of repairs to the Portage transmission line.

Engineering

The report of the chief engineer shows that two divisions of the work are being followed: The first was the undertaking of a supply of power over a system of transmission lines having their origin in the city of Winnipeg, and to which power was to be supplied from one or other of the power plants located on the Winnipeg River. This may be referred to under the general head of "Portage Transmission System."* The second division of the work was the supply of power to those points in the province where at present it is inadvisable to make extensions of this Portage system. A start in this work has been the construction of two fuel power stations, one at the town of Virden and the other at the town of Minnedosa. On consulting the map of the province it will be seen that these activities are located at widely separated points. They have been located, however, with the idea that ultimately a system of fuel plants in the western and southwestern corner of the province may be inter-connected by a system of comparatively low-pressure lines, thus forming a network supplied from fuel stations, and it is possible that at some future date these extensions will be tied in, at one or more points, with the Portage system. This may take years to accomplish, but if the work at the start is undertaken with this result clearly in view, it will be found that in the end great economy has been achieved, and that the greatest security in service will obtain.

The commission has advanced from an era of construction to a time of operation. The Portage line is being operated by means of patrol men, and operation will, within a few weeks, commence in the fuel stations at Virden and Minnedosa. The organization of our patrol system on the Portage line has been rather difficult in view of the fact that long distances of the line are removed from points where the patrolmen may find housing accommodation, but the commission proposes to remedy this by the construction of several residences of suitable character, located at convenient points on the various lines and which may be rented to the patrolmen.

In work such as that which the power commission has undertaken it is generally considered that a charge of from ten to fifteen per cent. of capital for engineering costs is reasonable. An inspection of the financial statement will

show that the power commission has spent for this purpose only about four per cent. of its entire capital investment.

Recommendations

In order that the municipalities under contract with the commission may have the best possible facilities for expressing themselves as partners in the work of the commission, the commission recommends that an organization, which may be known as the "Manitoba Municipal Power Union" be formed, and that it nominate for appointment on the commission a representative—preferably an engineer with experience in engineering accounting, particularly with reference to contracts, rates and the various factors of inter-relation between the municipalities associated in this kind of work. This appointee should have a place in the commission, as associate to the power commissioner; his function should be to represent the municipal councils in all their activities on the board; he should be qualified to co-ordinate all their requests and demands and to express all their needs; he should be qualified to give them instruction on all questions affecting rate making. Without enlarging any further on his functions, or the position of the proposed "Union," it will readily be seen that such a proposal, should it come into effect, would be the greatest factor in the promotion of harmony and comprehensive action between the commission and the municipalities.

It would also have the effect of making it clear to the municipalities that the ultimate success of all the activities of the power commission are as dependent upon the attitude of the municipalities toward it as to anything that can be done by the commission. It will also cause them to appreciate the sense of responsibility they must feel if ultimate success is to be achieved.

Electric House Heating by Storage for Peak Periods

We publish below an interesting letter covering the electric heating of a private residence during the past two winters. Electric heating has been discussed from many angles, and though it is impossible to hope for anything very universal in the way of substituting electric energy for coal, there are, nevertheless, certain conditions under which electric heating can be a success. One of these is that the electric energy might be utilized during off-peak periods. Every central station company has a quantity of power available during a certain part of the twenty-four hours, and more particularly where the energy is developed by water power. This could be sold for a very nominal figure and still represent a profit. The installation referred to below made provision for cutting off the current during the peak period, and in this way seems to represent an advance over any of the other methods of electric heating that have been tried out up to the present time.

Ottawa, Ont.

Editor, Electrical News:—

In your March the 1st issue of the Electrical News, there is an article on industrial electrical heating which is very interesting to me, as I have done considerable experimenting along the electrical heating line. My experiments, however, have been in the heating of private dwellings, although I realize that the best field for electric heating is the large industrial buildings, where a large amount of power will be required thereby reducing the installation and distributing cost per kw.

Few engineers have considered the off-peak power available in most large centres as a factor in the electric heating field. This power at present may be considered as a by-product as no proper method has been devised for its utilization over the 24 hours. It is along those lines my experiments have carried me.

I have had an off-peak electric heating furnace in oper-

ation during the winters of 1919-1920 and 1920-1921 which has been very satisfactory although I can't get the cost of operation as low as Mr. Scott reports in his tests for the Canadian Cotton Company.

My furnace is of cylindrical construction and is 6 ft. high and 3 ft. in diameter. It is covered with 2 in. of a good heat insulating material. In the centre of this cylinder is a cast-iron core weighing 4,800 lbs.—about 20 lbs. per kw.h. Surrounding this core are circulating pipes which are connected to the hot water heating system of the building in the same way as the regular hot water furnace, but with a thermostatic control valve on the main delivery pipe to regulate the flow of water in the system according to the heat requirements. The special heating elements (even of them) are each connected in multiple to a separate switch and are all controlled by a time switch. This switch is set to open at 4 p.m. and close again at 11 p.m., the storage capacity of the iron core taking care of the heating requirements for the system while the power is off. The storage capacity has figured out correctly, as during the coldest day in the winter of 1919-1920 the temperature of the house never dropped below 63 per cent. F. A thermostat is used in connection with the iron core; should the core temperature go above 800 per cent. C a small coil trips the main switch. This is more of a safety valve arrangement and has been little in use though it is very necessary.

The furnace has a capacity of 35 kw. and is installed in a three-storey private dwelling of 40,000 cu. ft. capacity with a solid brick garage attached of 2,500 cu. ft. capacity. From tests made on costs of operation taking power at $\frac{1}{2}$ c to 1 c per kw.h., this furnace will operate at a cost within the reach of the average man, when taking everything into consideration.

The field for this type of furnace is limited to the off-peak power available in our large cities and towns. The quantity of this power in kw. is in direct proportion to the population and is all ready developed with the distributing wires installed. The power companies can afford to sell this power at a price in competition with coal and make a fair profit as it is "found" money for the company, there being no other market for this off-peak power. It is not a great quantity but it is all ready developed and waiting which is not the cases in most places where power is required for a straight heater load.

Yours very truly,

R. P. Moodie.

Financing Public Utilities

The speaker at the Electrical Co-Operative Luncheon, Montreal, March 23rd, was Mr. A. J. Pratt, of Nesbitt, Thomson & Co. Mr. Pratt, speaking on the "Financing of Public Utilities," stated that the public was showing a marked interest in public utilities companies, now that there were regulating commissions between the public and the companies, insuring a square deal for all parties. With regard to the financing of public utility companies, the ideal way, said the speaker, would be the issuing of preferred or common stock only, and doing away with the handicap incurred by bond issues, with their maturity obligation. The out of town guests included: Messrs. J. S. Lawson, New York; J. R. Ackman, J. Swan, Winnipeg; F. W. Leavitt, Toronto; C. A. Hayes, Cowansville; J. R. Gregoire, Waterloo; E. St-Onge, St. Hyacinthe; A. P. Broadhead, Granby; B. Faraday, Richmond; G. O. Pinsonnault, St. Hyacinthe; C. W. Cowan, St. Johns; F. X. Couture, Sherbrooke; E. N. Spence, St. Hyacinthe; J. A. Page, St. Cesaire; F. A. Chisholm, Sherbrooke.

Mr. St. Clair John Shadwell, who for the past twelve years was connected with the British Columbia Electric Railway Company, died suddenly at his home in Ch'ilwack, B.C.,

The Electrical Contractor

Varied Suggestions Re Standard Estimate Sheet

Form Submitted by Committee Meets With Approval. Contractors Agree on Importance of Standardization

In this issue we continue the discussion on the Estimating Sheets submitted by the special committees appointed by the Ontario Contractors' Association. One of the most encouraging features in connection with this discussion is that a number of contractors who have never used Estimating Sheets, and, indeed, apparently never felt the need of them, have expressed their interest and belief in the forms submitted by this committee and state that they will use them as soon as they are available.

We have spoken from time to time of the work of the Electrical Estimators' Association of New York, and there has just come to the writer's attention a statement by Mr. William J. Shore, an electrical contractor of that city, regarding the value and the possibility of correct estimating. Mr. Shore speaks of the estimating done by most contractors as "guesstimating." His remarks follow:

"I have been told that estimates on the cost of electrical construction work were based on the cubical contents of a building, at so many dollars per cubic foot. In other cases estimates were based on the weight of the plans the architect submitted. As a matter of fact these methods are still practiced by the man who estimates at so many dollars per outlet. And there is the man who makes up estimates on his cuffs and then loses his cuffs.

"Since that time there have been great improvements in the art of estimating and it is now becoming a science of estimating.

"There is nothing that discredits a business so much, in the eyes of the business world, as a lack of uniformity in the costs of rendering service. Large variations in prices serve to create two impressions. One, that an unusually large profit is demanded by the higher bidders, and the other impression is, that electrical contractors do not know their costs.

"As a matter of fact, contractors do not make an unusually large margin of profit, and as a rule, they do know their prime costs, namely, the actual cost of labor and material consumed on the job.

"In the presentation of a complete estimate on the electrical construction work, the final figure is composed mainly of two parts: The first consisting of the actual costs of labor and material required; the second consisting of a percentage of the above costs for overhead, and another percentage for profit.

"Assuming for the moment that the percentage for overhead and profit is identically the same for all concerns, the various estimates submitted would vary, depending upon the accuracy of estimates prepared.

"Fundamentally, therefore, if the estimates are correct and exact, the final figures submitted will be uniform, pro-

vided all contractors use the same percentage for overhead and desire the same percentage of profit.

"The estimator, per se, is only concerned with prime costs, and if he has succeeded in securing accuracy in this field of endeavor and in eliminating guesswork, he has reached a high state of efficiency."

Suggests Minor Changes

Dundas, Ont., April 2, 1921.

Editor, Electrical News:

In accordance with your request of the 29th, I beg to say that my not having replied to your former letter was not due to any lack of interest on my part. I felt that the matter was probably in the hands of men whose judgment was far superior to mine. However, as you request, I beg to submit the following criticisms: The sheet as it stands would be O. K. for such jobs as are exhibited thereon. But you provide for a ten-storied building, when you would require equipment for which the sheets would be inadequate.

The fourth and following floors of most buildings are repetition. Why not make the form read: basement, first, second, and third floors, fourth and following floors; this leaves you six lines on your material and labor cost. Then you have prepared for five figures in your dollars columns in your totals. Why not cut off two in each case, giving you four more lines? The space so saved would enable you to run another total cost section for conduit, stock bends, and condulets, and isolate them from all other work. Then you have thirty-six perpendicular columns, available for material other than conduit, stock bends and condulets. Then I would leave them all blank except for the collective headings, general material, conduit, etc.; the other headings would be easily inserted, and I do not think thirty-six will be too many for the varied jobs.

I would also provide space for job numbered on sheet "A" as on sheet "B," and on sheet "B" provide space for permit number, inspector's name and date of final certificate.

Respectfully yours,

J. W. Cockburn.

Figure Percentages on Selling Prices

Brantford, Ont.

Editor, Electrical News:

Re Electrical Estimate Sheet. I think it is a step in the right direction, which is to try and educate the contractor to business like methods and get him away from the habit of figuring up the price of a contract on a piece of tea paper, or the back of an old letter he may happen to have in his pocket and quote a price right on the job, taking his prices from memory. There is more of this done than you might imagine, especially on the smaller jobs.

The form seems a little complicated to be popular with the type of contractor above mentioned, but I believe it would be a good thing to have even though everyone could not be induced to use it.

It would have to be a pretty large sheet to give spaces large enough to keep the average man from making it look pretty messy when he got through with it.

My chief objection to the sample sheet shown is in the

4th: The reminders in the margin are not arranged in the order that one naturally thinks of them in estimating a wiring job, that is,—Lighting Circuit Materials, Feeder Ma-

SHEET NO.		ESTIMATE SHEET											
Owner	Building Type	Height	3 Way	4 Way	5 Way	6 Way	7 Way	8 Way	9 Way	10 Way			
Address	Floor	Ceiling Outlets	Brackets	Base	Floor	S. Pole Flush Outlets	3 Way	4 Way	5 Way	6 Way			
Architect	Construction	Bracket	"	"	"	"	"	"	"	"			
Address	Length	Base	"	"	"	"	"	"	"	"			
Engineer	Width	Floor	"	"	"	"	"	"	"	"			
Address	Area	S. Pole Flush Outlets	"	"	"	"	"	"	"	"			
MATERIAL		QUAN- TITY	PRICE	MATERIAL COST	LABOR UNIT	LABOR COST	MATERIAL		QUAN- TITY	PRICE	MATERIAL COST	LABOR UNIT	LABOR COST
LIGHTING CIRCUIT MATERIAL						MOTORS							
REMINISERS:						Conduit							
Conduit						Condulets							
Bends						Bends							
Outlet Box						Outlets							
Fixture Stud						Panels							
10-14 Screws						Fuses							
Plaster Ring						Leg Screw							
Sw. Boxes						Screws							
S.P. Sw.						Wire							
3 Way Switch						Pipe Straps							
B.X. Flexible						Grounds							
Connectors						Hangers							
Locknuts						Locknuts							
Bushings						Bushings							
Fed. Bush.						Comp. Sw.							
Wire						Loom							
Loom						Cables							
Knobs						Tubes							
Tubes						Pull Box							
Condulets						TOTAL #1							
Tape						Bells							
Solder						Push Buttons							
Receptacles						Wire							
Sockets						Apparatus							
Lamp Cord						Transf.							
Screws						Heaters							
Pull Boxes						Stoves							
Pipe Straps						Speaking Tubes							
Grounds						Letter Box							
TOTAL #1						Cables							
SERVICE, PANELS, FEEDERS						Telephones							
Entrance Switch						Signs							
Conduit						TOTAL #2							
Condulets						RETURNERS:							
Sweeps						Permits							
Wire						Cartage							
Lead Cable						Carfare							
Pot Heads						Board Bills							
Crook						Railway Fare							
Locknuts						Fish Wire or Tape							
Bushings						Lumber							
Lugs						Nails							
Dist. Panel						Meter Board							
Light Panels						TOTAL #3							
Light Feeder						TOTAL #4							
Fuses						TOTAL #5							
Outlets						TOTAL #6							
Pull Boxes						TOTAL #7							
Sw. Boxes						TOTAL #8							
TOTAL #2						TOTAL #9							
TOTAL #3						TOTAL #10							
TOTAL #4						TOTAL #11							
TOTAL #5						TOTAL #12							
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materials, Service Equipment, Bell Wiring Materials, etc., are indiscriminately mixed.

We are enclosing a print of the sheet which we are using at the present time, the tracing of which we made some time since for use until such time as a standardized sheet is available. This sheet is designed with the following ideas in view: that a person estimating a wiring job, first would look over the plans and specifications and ascertain the number of various kinds of openings to be wired for, various dimensions, area, etc., of the building, after which he would lay out the lighting circuit wiring and list material for same. He would then be able to determine the size of lighting feeders and risers, specifications for cabinets, etc., after which it would be able to be determined definitely the service and distributing equipment required, after which would come motor wiring, bells, clocks and other miscellaneous equipment. We also find that it is desirable to have separate totals for labor and material for various distinct parts of the installation for checking purposes.

After making this tracing we found that it would have perhaps been better to have listed motors, ahead of feeders and riser materials and directly after the lighting circuit equipment. Materials listed in the margin are intended only as reminders which accounts for repetitions.

We do not consider this sheet as anywhere nearly perfect, but have found it satisfactory for the short time we have been using it. For estimating large jobs, one of these sheets could be used for each floor of any office building or one for each building in the case of an industrial plant.

Yours truly,

McNaughton-McKay Electric Co., Limited,

A. E. Roach, Manager.

Expense Account "Always With Us"

Brantford, Ont.

Editor, Electrical News:

Answering yours of recent date as to expressing opinion on the Estimate Sheet submitted by the committee of "The Ontario Association of Electrical Contractors and Dealers," I would ask you to kindly consider the following:

That the estimate sheet as submitted seems to be very fully designed to cover all those weaknesses to which the wiring contractor has a tendency to lean.

If he consistently follows out this method, he will certainly be better off than if he follows his happy-go-lucky ways as of old.

That I cannot entirely agree with Mr. Rohleder's method of figuring the percentage of profit which is shown as being based on cost instead of on sales. Still, after all the real object in view is to ensure a profit to the contractor doing the work, and I feel if this form is adopted that it will tend much towards this end, and that the committee in charge of this work deserves much credit for the very comprehensive estimate sheet produced.

There is, however, one phase of the situation that I think should be considered and that is the human side. It seems to be a weakness inherited by the trade that they will adopt any new system which is pushed along sufficient to attract their attention—then promptly "pigeon-hole" it and go along in the same old way of figuring the job by comparing it with a price they got—or did not get—on some job recently figured,—quite often with disastrous results.

Personally, I have adopted the method of carrying a Re-sale Price Service and estimating on the re-sale price with a percentage off in proportion to the quantities used and the terms of the contract, which method has proved very satisfactory and has the advantage of dealing in figures that you

do not mind the customer seeing, and if any changes are subsequently made the customer can be taken more into your confidence as to the cost of said changes.

In conclusion, let us recognize our Expense Account as being, like our poor relations, "always with us," and also the fact that a little system in our business well used is better than a lot of system little used.

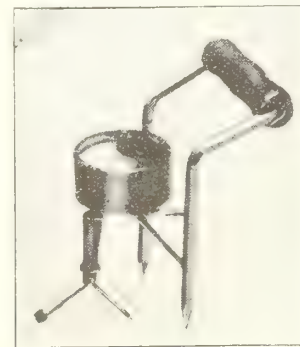
Yours truly,

Henry E. White,

President, Telephone City Electrical Club.

Hydrate Battery Anylizer

The Service Station Supply Co., Detroit, have placed upon the market an instrument known as Hydrate Battery Anylizer, which possesses the feature of making a high rate discharge through patented Chromel resistance and combines with it the unique arrangement of a third terminal volt meter of an easy reading type. Attached to the third terminal of the meter, by means of a flexible lead, is a fork spike as shown in cut. One spike of the fork is the test point for voltage test and the other spike is the cadmium electrode for making cadmium test. The Hydrate Battery Anylizer is thus a complete battery testing outfit, capable of making three different kinds of tests of storage batteries, as follows: high rate discharge test; plain voltage test; cadmium test. In



addition to the original two terminals of this instrument a third terminal has been added from which a calibrated resistance leads to the moving coil of the instrument itself. To this third terminal is attached a flexible lead as described above. The addition of the third terminal and lead (which is removable as a matter of convenience) in no way interferes with the use of the instrument as a cell tester. However, when it is desired to take open circuit voltage readings or cadmium readings, either one of the prods of the tester is applied to the positive terminal of the battery and the lead connecting the third terminal of the instrument is applied either to the other terminal for open circuit reading or the cadmium spike electrode is immersed in the electrolyte to give the positive cadmium readings. For the negative cadmium reading the prods are merely shifted to the negative terminal.

The Electrical Co-operative Luncheon, Montreal, have decided to continue the luncheons this year into May, instead of having them end in April, as has hitherto been the practice.

Mr. W. Ross Hilton, formerly of the Crown Electrical Manufacturing Co., Brantford, Ont., has been appointed sales manager of the illumination division of the Northern Electric Co., Ltd., Montreal. While the company have for years devoted considerable attention to illumination engineering and appliances, it is considered that the subject is now of such importance as to warrant the formation of a separate division.

Grounding Appliances in Homes

Further Discussion by Two Well-Known Engineers
—Suggestion to Form a Committee

Calgary, Canada.

Editor, Electrical News:

Owing to pressure of business I have not had an opportunity to give very much thought or consideration to the subject matter of your letter, but I feel that it is not economically feasible to install or to so arrange the wiring and so protect the appliances as to make absolutely impossible accidents such as took place in Toronto which resulted in the killing of a woman through the grounding of a standard air heater.

Not having the full particulars of the investigation which was made to ascertain the various causes responsible for this accident, it is difficult for one to arrive at a conclusion that would enable him to suggest methods to prevent a re-occurrence. But speaking from what information I have at hand concerning the matter and from a general knowledge of the dangers which exist from the use of our present standard heating appliances in a bathroom, it appears to me that there are only two avenues open which might improve matters; first, a more rigid inspection of our portable heating appliances and, second, prohibiting of their use except when equipped with a three contact or the grounding type of plug.

While our wiring regulations and rules have done a lot of good we can legislate to a point with respect to safety devices and methods of installation that will very materially retard the progress of the electrical industry and may perhaps go so far as to increase the installation cost to a point that will make the electric service so expensive as to put it out of the reach of the people of moderate means, the very people whom I believe we should be trying to serve. For that reason I do not think we would be acting wisely, in view of the very limited number of accidents which occur to users of electrical energy, to pass any rule that would be so sweeping in its nature as would inflict a hardship on all domestic users. Proper enforcement of our present regulations and probably a new regulation calling for increased insulation and more rigid inspection of our standard heaters would cover the point and would add no increased burden to those who are not using the device in question.

Yours truly,

R. A. Brown.

General Superintendent Electric Light & Street Railway Dept.

Toronto, April 11, 1921.

Editor, Electrical News:—

I have read with much interest your editorial upon bathroom fatalities and the comments which it has elicited. There are no lack of Rules and Regulations covering the installation of fixtures and portable devices in damp places as witness the following:

British Institute of Electrical Engineers—Rule No. 38

Bathrooms. "In bathrooms and damp places special precautions must be taken to prevent the possibility of personal contact with any part of the system."

Hydro-electric Power Commission—Rule 1—"L."

In Damp Places. "All exposed metal parts of apparatus, fittings, fixtures, etc., which do not carry current, including supports, covers, and the like must, for all potentials, be permanently and effectually grounded."

"Grounding of exposed metal parts which do not carry

current is necessary in damp places for all potentials, and not only for those above 300 volts, already required under ordinary conditions."

The American National Electrical Safety Code recommends for adoption—No. 371—Grounding.

(a) The permanent grounding of frames of portable devices (especially in connection with voltages above 150 to ground, and for any voltage when the devices are used within 8 feet of the floor in locations such as bathrooms, laundries, etc., where persons may easily touch grounded surfaces at the same time as the device) is recommended as a safety measure, where this is practicable and suitable means are available, but can not, of course, be reasonably required unless such means are available.

"Such grounding may be obtained by the use of a 3-wire portable cord with the portable device, one wire being used for the ground conductor and the connectors being properly designed so that wrong connections can not be made by the user of the device."

Strong committees of the N. E. L. A. and other bodies have given this subject very careful attention, but in view of the widespread use of portable devices together with the difficulty of inspection, it seems practically impossible to rigidly enforce these rules.

It would seem that education as well as reasonably enforced rules are necessary.

Ten years ago we had the fear that if we advertised the possible dangers of electricity that it would discourage its use.

Clear, but not alarmist warnings, e.g., upon electric light bills, that the customer bring in faulty devices or cords for repairs, would not be amiss.

In order to deal adequately with this question, might it not be well to consider the appointment of a committee, with representatives from the principal bodies interested, such as the Canadian Electrical Association, Ontario Municipal Electrical Association, Wiring Contractors, Electrical Manufacturers, Hydro Inspection Department, Canadian Fire Underwriters' Inspection Department, etc., with power to add to their number.

No final report could be expected in a short time, as all aspects of the question are to be fully and justly considered. Therefore, it should be a standing committee reporting progress from time to time until the problem is satisfactorily solved.

For Ontario, I presume, the recommendations of such a committee should go to the Hydro-electric Power Commission and for the rest of Canada to the Canadian Fire Underwriter's Association, also to all bodies represented upon the committee.

Possibly it might be desirable to have two branches of the committee, namely, one in Montreal and the other in Toronto with corresponding members from the Maritime provinces and the West in order that the various interests should be properly represented and to facilitate the presentation of recommendations to the different bodies having jurisdiction in enforcing the rules.

The above is intended to be more or less suggestive, but I trust that it may help in solving the problem.

Yours very truly,

A. L. Mudge

The Bryant Electric Company of Bridgeport, Connecticut, manufacturers of wiring devices, recently completed a four-storey and basement steel and brick building, which will be used as a finished goods warehouse and shipping department. The building is T-shaped, covers a space approximating 244 feet by 60 feet and contains over 67,000 square feet of floor space. It is white enameled throughout like other buildings of the Bryant factory, and a portion of the upper floor will be used as a rest room for women employees.



BETTER MERCHANDISING



Ample Power From Chippawa Promised For September

Electrical Industry in Ontario Now Has Something to Work For—Let Us Use Our Organizations to Boost Business'

The pronounced shortage of power in Ontario appears to be a thing of the past and we are promised that next September will see the province provided with an ample supply of electric energy generated by the Hydro-electric Power Commission of Ontario at Queenston. A recent Cleveland campaign which had primarily for its object the increase in demand for electric energy and, secondarily, the consequent increase in demand for every kind of equipment that uses electric energy will, therefore, be of special interest to the towns and cities throughout the province. Other towns and cities in the Dominion where the supply at the present time is greater than the demand will be equally interested.

The description that follows covers the operation of what is known locally as the Cleveland Electrical Development Campaign and it has been under way for about six months. The information comes first hand from a Canadian who was actively engaged in that campaign and was responsible for a considerable measure of its success.

The campaign was inaugurated by the Cleveland Electric Illuminating Company, which is the central station company of that city, and the object was to create a closer contact between the company, the various other elements in the electrical trade and the public, to the end that the sale of both electrical current and electric equipment might be increased. Co-operation was first enlisted of the following associations: The Electrical Contractors' Association; the Residence Wiring Association; the Electrical Dealers' Association; the Lighting Fixture Dealers' Association, and the Cleveland Electric Illuminating Company. These organizations formed themselves into what was known as the Electrical League.

The general outline of the campaign is shown in the announcement which appears on the opposite page.

Paying the Expenses

The first step was the provision of an expense fund. The members of the five different organizations together soon subscribed \$50,000 for this purpose, in addition to which the Illuminating Company donated some \$12,000 worth of advertising space and the services of an organizer in the person of Mr. J. E. North. In all, the expenditure to date has amounted to approximately \$72,000—this in a city of somewhere around 800,000 population.

The \$50,000 originally provided was roughly apportioned as follows: general publicity, \$15,000; scholarship contest, \$5,000; the establishment and exhibition of three model electrical homes, \$12,000; industrial lighting exhibit, \$8,000; a school for salesmanship, \$5,000; office, salaries and equipment, \$5,000.

Industrial and Commercial Lighting

The industrial and commercial lighting exhibits were among the most important features of the campaign. Demonstrations of up-to-date methods of illumination were given

under such conditions that business men were enabled to see the advantages of better lighting. For example, members of the Lighting Committee of the Electrical League addressed various business men's organizations requesting them to send representatives to view the exhibit and report back to their club. At a later stage in the campaign the whole membership of the club was invited to witness the demonstration. A very general interest was aroused among the better business men in this way.

The Model Homes

Another feature which has proven of unusual interest and value is the establishment of three model electrical homes at different points in the city which are equipped electrically as near to the ideal as it was possible to make them. So as to keep the expense of this feature within reason the services of real estate men were first enlisted. These placed three homes that were still under construction at the disposal of the League who were thus enabled to have the houses properly wired for lighting and all household conveniences. The large department stores gladly supplied furniture for these homes, considering that the scheme had sufficient advertising value. The public are at liberty—indeed, are urged—to visit any or all of these homes at any time of the day, and demonstrators, who themselves live in the homes, are always ready to discuss the merits of the various appliances and demonstrate their value. It is said that the effect on the general public of seeing this equipment actually operated in real homes has had a wonderful stimulating effect on the retail appliance business.

Getting the Boys and Girls

It was also considered necessary to interest students—the boys and girls in the high and public schools—and to this end a number of scholarships were provided, to be given on the basis of results of examinations following a course of lessons. The number of lessons was about thirty and these were published twice a week in the "Cleveland Plain Dealer." A sample of the lessons, shown in another place in this article as Lesson No. 2. For the best examination paper the prize is to be a four years' scholarship to the Case School of Applied Science, and other prizes to the value of \$3,500 are also being given.

Another feature was the offer of prizes for the best essays on a number of electrical subjects such as the advantages of an electric washing machine in the home, etc., etc.

Meetings for Electrical Workers

Yet another feature was a series of educational meetings for electrical workers. In Cleveland there is an Electrical Employees' Association, and these men to the number of 500 or more evinced the greatest interest in learning more about their work. Lectures were delivered, of a non-technical nature, on various subjects and the workmen were encouraged to attend and take part in the discussions. It is said that this was one of the most successful features of the whole campaign, as the workmen showed the greatest desire to learn as much as possible about their own business.

School for Salesmen

Other features were a school for electrical salesmen and a campaign for better accounting systems for electrical contractors and dealers. In the school for electrical salesmen

Announcing

THE Cleveland Electrical Development Campaign

Under The Direction of ELECTRICAL LEAGUE

Through a broad minded spirit of co-operation, developed and fostered by the Electrical League, the members of the electrical industry in Cleveland have joined together in a constructive movement to extend its usefulness to the community.

To accomplish this aim, The Cleveland Electrical Development Campaign is now being launched, providing an intensive educational program for the improvement of standards of service and business methods within the industry, and for the further enlightenment of the public on the advantages to be derived from the proper use of electricity in the factory, office, store and home.

The following outline of the various activities already scheduled shows the importance and scope of this program.

An Industrial and Commercial Lighting Exhibit

A demonstration of up-to-date methods of illumination will be given at an Industrial and Commercial Lighting Exhibit, to be held over a period of three months, at the Electrical League. The advantages to be derived from proper lighting will be demonstrated and explained to factory executives, superintendents and foremen, and also store and office executives.

Model Electrical Homes

To show the public how electricity can be used to best advantage in the home, three model electrical homes, ranging in value from \$15,000 to \$70,000, will be built in various parts of the city and opened for inspection. These houses will demonstrate the many ways in which electricity can contribute to the attractiveness, comfort and convenience of the modern home.

An Electrical Scholarship Contest for School Students

To stimulate greater interest in electricity among the younger generation, a practical electrical course will be given in one of the daily papers. The course will consist of 30 lessons, at the completion of which an examination will be held. The first prize will be free tuition in Case School of Applied Science for the full term of four years.

Educational Publicity

In addition to advertising featuring the above activities of the Electrical League, educational publicity will be run regularly in the electrical pages of the daily papers, to give the public helpful hints and information on how to buy and use all kinds of electrical equipment for residential, commercial and industrial purposes.

This constructive program has been made possible by the financial support and unselfish co-operation of the following firms representing all branches of the electrical industry in Cleveland: manufacturers, jobbers, contractors, dealers and the lighting company.

A. B. C. Appliance Co.
A. B. Div. Nat. Screw & Tack Co.
The Adapti Co.
Ajax Electric Co.
American Steel & Wire Co.
Apex Electrical Distributing Co.
Art Metal Manufacturing Co.
A. & W. Electric Sign Co.
Berg-Clark Electric Co.
Wm. Bonkowski.
Brite-Lite Electric Co.
Brookins Co.
Brooklyn Electric Co.
Buchan Electric Co.
Buckeye Lamp Div. of G. E. Co.
Carlyon Electric Co.
Central Electric Co.
Chicago Fuse Manufacturing Co.
Citizens' Electric Construction Co.
City Electric Co.
Clark Electric Wiring Co.
Cleveland Armature Works Co.
Cleveland Electric Illuminating Co.
Cleveland Electrical Supply Co.
Cleveland Switchboard Co.
Cleveland Washing Machine Co.
Colonial Lamp Div. of G. E. Co.
Continental Electric Co.
Correct Electric Co.
Crescent Brass & Mfg. Co.

Cutler-Hammer Mfg. Co.
Cuyahoga Power Supplies Co.
A. C. Day Electric Co.
Denzel Electric Co.
Delco Light Products Co.
Dingle-Clark Co.
Doan Electric Co.
Domestic Electric Co.
Duboy Electric Co.
J. J. Dunn
Eagle Electric & Supply Co.
Economy Fuse & Mfg. Co.
Edison Electric Appliance Co.
Electric Supply Co.
Electric Necessities Co.
Electrical Distributors Co.
Electric Construction & Sales Co.
Electric Fixture & Appliance Co.
Electrical Manufacturing Co.
Electric Vacuum Cleaner Co., Inc.
Elliott Electric Co.
Enterprise Elec. Const. & Fix. Co.
Euclid Ave. Electric Fixtures Co.
Erner Electric Co.
Euclid-Doan Electric Co.
Fairbanks, Morse & Co.
Fitch Electric Co.
Frankel Light Co.
P. A. Geier Co.
General Electric Co.
Gradis Electric Co.

Grant Electric Co.
Haas Electric Sales Co.
Hamilton Co.
Harrington Electric Co.
Hausmann Electric Co.
Hibbard Company.
Hills Electric Co.
Home Electric & Fixture Co.
Home Commutator Co.
Hough Electric Co.
Ivanhoe-Regent Works of G. E. Co.
Thos. B. Jamison Co.
Kayline Co.
Kerber Electric Co.
Kinney & Levan Co.
Lakewood Electric Co.
John C. Laturell.
Leonard Electric Mfg. Co.
Light House Co.
Ludwig, Hommel & Co.
Luetkemeyer Co.
Malone, G. W.
Martien Electric Co.
McNerney Electric Co.
Merrell-Sharp Electric Co.
Modern Household Sales Co.
Model Electric Co.
Morreau Co.
I. T. Moyer Electric Co.
National Telephone Supply Co.
Newman-Stern Co.
O'Brien, J. V.
O'Neil, R. J.
Oden Electric Co.
Ohio Electric & Controller Co.

Educational Meetings for Electrical Men

A comprehensive schedule for educational work among electrical men has been mapped out. All men engaged in the electrical business in Cleveland will be invited to attend meetings at the Electrical League, at which subjects of common interest will be openly discussed. Addresses will also be given by well known men who will impart valuable information along the technical and business lines.

A School for Electrical Salesmen

To develop more and better salesmen for the electrical industry, a Sales School has been opened at the Electrical League. An intensive course in the fundamentals of salesmanship and business efficiency is offered on a basis which is making it possible for many young men to learn while they earn.

Better Accounting for Electrical Contractors and Dealers

In line with other educational work to help electrical men improve their merchandising and business methods, a course for the less informed adopt a modern system for keeping accounts will soon be put in operation.

Electrical Directory

To make available in one convenient source detailed information on where all kinds of electrical equipment can be purchased, a directory of 350 Cleveland electrical concerns is being compiled, listing the name, location and branch of business of each firm. A complete list of all electrical goods' manufacturers will also be included.

M. A. ...
Parker Electric Co.
Perme Electric Co.
Pfahl Electric Co.
Plating & Refinishing Co.
Reliance Electric & Eng. Co.
Republic Electric Co.
Reserve Electric Co.
Rogers Thor Electric Co.
John A. Roebblings Sons Co.
Scott Ullman Co.
Shelby Lamp Div. of G. E. Co.
Sterling Lamp Div. of G. E. Co.
Sterling & Welch Co.
Superior Electric Co.
Van Alt Collings Co.
Wallene Engineering Co.
Western Electric Co.
Westinghouse Electric & Mfg. Co.
Westinghouse Lamp Co.
Whitmer Electric Co.
Geo. Worthington Co.

Full details concerning any of the above activities can be secured at the Club Rooms of the Electrical League, Top Floor, Hotel Statler

an intensive course was given in the fundamentals of salesmanship and business efficiency. The Electrical League took this course realizing that the salesmanship end of the electrical business is one of its greatest weaknesses. This applies not only to Cleveland but is practically universal on this continent.

A final boost has been given to the campaign by the electrical page which has been running in the "Cleveland Plain Dealer" every day. So interested are the electrical men in this campaign that there has been no difficulty whatever in covering one page each day of this Cleveland paper and we are advised that material was frequently available, both advertising and editorial, to run into two pages.

Campaign Had Universal Support

This campaign had the support of about 130 companies, aside from individuals belonging to one or other of the five organizations mentioned, and there has been no apparent difficulty either in financing the scheme or providing the men to do the work. The Electrical League of Cleveland is evidently of a very similar nature to the Electrical Clubs that have been formed so generally in Canada, and represented under one name or another by certain organizations in Vancouver, Winnipeg, Toronto, Montreal, Quebec, Halifax and other cities and towns. We think it would be a fine thing if campaigns along something the same lines as that tried out in Cleveland could be put on by one or all of the similar Canadian organizations.

This information in the above article was obtained first hand from Mr. Frank T. Groome, who was a member, by special invitation, of the Industrial and Commercial Lighting Committee of the Electrical League, and was special representative of the Erner Electric Co.

This is a Sample "Lesson" as Published in the Cleveland Local Papers

ELECTRIC BATTERIES

Primary Cell

Early electrical experiments were made with electricity produced by chemical action.

If conductors of two materials, such as zinc and copper, or zinc and carbon, are placed in a conducting solution, such as dilute sulphuric acid, so that chemical action can take place between them and the solution at a different rate, an electromotive force (e.f.m.) will be established by this chemical action between the conductors. If these two conductors are then connected outside of the solution by a wire, a current will flow.

The two conductors are called electrodes and the solution the electrolyte. Such an arrangement is called a primary cell and may be used as the source of an electric current.

When current is drawn from such a cell chemical action takes place and either the electrodes or the electrolyte—or both—are used up. During this chemical action a gas is generally produced, such as hydrogen, which escapes.

A strip of copper and a strip of zinc are placed in a glass containing dilute sulphuric acid. The chemical action which takes place is such as to raise the electric pressure of the copper strip, or electrode, above that of the zinc electrode.

If the copper electrode is connected to the zinc electrode by a wire outside of the glass, a current of electricity will flow in the wire from the copper electrode to the zinc electrode. The terminal from which the current flows in the external circuit (the wire) is called "positive" and the one to which it flows "negative." The current flows through the

liquid from the zinc to the copper strip. Hydrogen will be given off as bubbles from the copper plate.

The Dry Cell

The familiar dry cell is a form of primary cell in which the electrolyte, instead of being in the liquid state is mixed with the chemicals to form a moist spongy mass. This makes it easy to carry. The term "dry cell" is not strictly correct, for if the cell actually dries out it cannot give current to the external circuit. The voltage of a dry cell when new is about 1.4 volts.

A combination of two or more cells is called a battery.

The Storage Cell

After a primary cell has operated for a certain length of time it can give no more current unless the electrodes, and sometimes the electrolyte, are replaced. If a cell is so made that, after electricity has been drawn from it, the electrodes and electrolyte can be restored to their original condition by passing a direct current through it, the cell is called a "storage" cell. A storage cell stores chemical energy which can be instantly transformed to electrical energy.

The Lead Storage Cell

The commonest form of the storage cell is the lead cell. One electrode or plate is made of lead oxide and the other of metallic lead in spongy form. These electrodes are immersed in a weak solution of sulphuric acid. This solution must be kept free from impurities such as are found in common lake water, so that distilled water should be used in such cells. The voltage of a lead cell in operation is about two volts. They must receive regular attention otherwise they will deteriorate rapidly.

The ordinary storage battery used for automobile lighting and ignition is commonly made up of three lead cells. Forty to fifty such cells connected in series are used to propel electric pleasure cars and industrial trucks. From sixteen to eighteen cells connected in series, when used in connection with a small generator to furnish light and power to country homes, comprise a country home lighting outfit.

The Edison Storage Cell

The Edison cell is a storage cell that has one electrode of metallic nickel in the form of thin flakes, and the other of iron oxide, both immersed in a solution of caustic potash which forms the electrolyte.

The Edison cell is rugged and does not require a great deal of attention. The average voltage of an Edison cell is about one and one-quarter volts. Its first cost is somewhat greater than that of the lead type cell of the same capacity.

Questions For Lesson

- 1—Describe a simple primary cell.
- 2—What is a dry cell?
- 3—What is a storage battery?
- 4—What is a battery?

This is one of a series of twenty-six lessons on electricity written by experts on the subject under direction of the Electrical League of Cleveland and published in The Plain Dealer. The first lesson appeared February 17. Succeeding lessons appear in The Plain Dealer on Mondays and Thursdays of each week.

Forty-eight boys and girls in Cleveland and its immediate suburbs who make the best grades in a final examination on these lessons will each win a prize. These prizes range in value from a scholarship in Case School of Applied Science to \$25.

Full information on this contest or copies of lessons can be obtained from the Electrical League, fourteenth floor Hotel Statler. Phone, Prospect 3466. Entries may be made in the contest any time prior to March 10, 1921.

Winnipeg Home Building Exposition

Electrical Dealers of Winnipeg Have Splendid Exhibits

One of the most successful Expositions ever held in Western Canada, took place in the Board of Trade Building, Winnipeg, from the 28th March to the 2nd April. Everything pertaining to the building of a home was shown. The chief attraction of the Exhibition was a Bungalow valued at \$4,000.00. A numbered coupon attached to each programme, which was sold at a cost of ten cents each, entitled the holder to a draw for the free Bungalow at the close of the Exposition. About 100,000 programmes were sold, and at 10 o'clock Saturday night Helen Curle, the four year old daughter of J. H. Curle, secretary of the Retail Merchants' Association, withdrew one ticket from an Electric Washer where the coupons had been deposited. This ticket showed the name of Harry Beazley, a printer on the Manitoba Free Press, as the lucky winner of the Bungalow. The municipality of Fort Garry donated a lot to the winner of the bungalow.

The following electrical dealers are to be highly complimented on their Exhibits:

The City of Winnipeg Hydro-electric System, had a very attractive display showing the Hoover electric suction sweeper; Moffat ranges; Eden washers; Apex washers; Miss Simplicity washers; Moffat grates; Westinghouse electric sewing machine; floor lamps; and numerous smaller appliances. During the week 25,000 coupons were given out, each one entitling the holder to a guess as to the weight of the dust picked up from a rug swept once a day with a Hoover Electric Vacuum sweeper, the lucky winner to receive a Hoover sweeper. Needless to say this exhibit attracted huge crowds. Mr. W. T. King, publicity agent for the Winnipeg Hydro presented His Excellency the Governor General with the report of the annual statement of the Winnipeg Hydro-electric for the year 1920. The Duke thanked Mr. King and said he had no doubt it would prove very interesting and instructive reading.

McDonald & Willson Lighting Co., had a very brilliant booth, featuring electric fixtures, principally of the candleabra type. They were also displaying the Trojan electric washer; Moffat ranges; Northern Electric sewing machines; Apex vacuum cleaners; Westinghouse cozy glows; Thermo-electric water heater, and various other lines. Mr. Lee Dixon, western manager reports a very fair number of sales made during the week, also a large number of prospects for the future.

The Winnipeg Electric Railway Co., came in for their share of attention especially with the Western Electric dishwasher. This appeared to be something entirely new as far as the people of Winnipeg were concerned. The attendants were besieged by them most of the time with questions, as to the operation and cost of the machine, and in most cases they seemed surprised at the reasonable price. The Winnipeg Electric should make a number of sales through the display of this dishwasher; amongst other appliances shown were, the Eden washer; Simplex mangle; Moffat range; Moffat grate; Hoover electric vacuum sweeper; Royal vacuum cleaner; Westinghouse cozy glow, and various small appliances.

Schumacher-Gray Co. Ltd., had a busy time demonstrating the Laun-dry-ette electric washer. This being the only machine of its kind in the show, naturally created considerable attention. The feature of the Laun-dry-ette is in the fact that it does not require a wringer in the drying process; the water is thrown out of the clothes by centrifugal force, the tub being raised above the water, then making about 650 revolutions a minute. This tub being perforated allows

the water to pass out and return to the lower part of the tub. The balance of the display was made up of the following: Mitchell vacuum cleaner; Hughes electric range; Westinghouse cozy glow; electrical fixtures, etc.

The Sibbald Electric Co. Ltd., had a very pleasing display, their chief lines being the Eden washer; Moffat range; Moffat circulation heater and the Thermo heater manufactured by the Canadian Electrical Products of Brantford, Ont.

The Winnipeg Engineering Co. Ltd., was another firm whose exhibit attracted considerable attention, the Eden washer, Moffat range and electrical fixtures, being the chief items of interest; they also had on view a number of smaller appliances.

The Maytag Co. Ltd., displayed four different types of electric washing machines: The Cabinet Cylinder; Wood Dollie; Aluminum Tub Dollie; and the double Tub Aluminum Dollie type. The Maytag seemed to be a popular washer with the public.

The Guarantee Iron & Drop Forging Co., who have been manufacturing laundry washing machines for the past seventeen years in Winnipeg, are now starting to introduce an electric washer for the home, on which they have been experimenting for the past two years, until satisfied that they cannot improve on it. They had four of these machines on exhibit which created considerable attention, owing to the fact that they were made in Winnipeg, and offered to the public at a reasonable price. Mr. D. A. Urquhart, managing director of the Manifold Light & Power Ltd., Winnipeg, is distributor for Western Canada, with offices located at 406 Canada Building, Winnipeg. It is the intention of the manufacturers to extend their plant, to allow an annual output of 2,000 washers.

The Electric Appliance Co. Ltd., were showing the electric requirements for a model kitchen and bathroom, which was the only exhibit of its kind at the Exposition. This firm also displayed Moffat water heaters and ranges; Branston violet ray generator; and smaller fixtures required for the bathroom and kitchen.

Standardization of Lighting Fixtures

At the meeting of the Council of the Illuminating Engineering Society held on March 10, 1921, the following resolution was adopted:

Whereas in the opinion of the Council of the Illuminating Engineering Society the project for rendering lighting fixtures readily removable by the employment of suitable electric attachments as discussed at the January meeting of the New York section of this society, offers potentiality for large improvement in lighting conditions, and

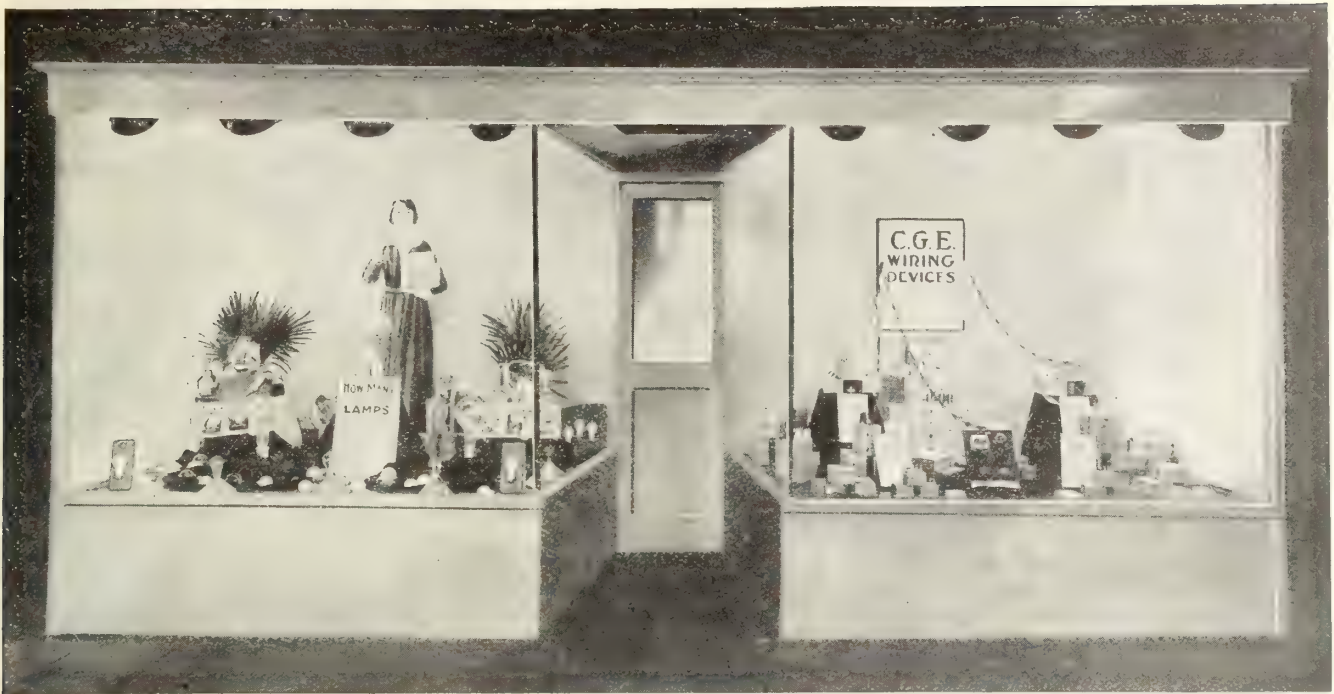
Whereas realization of the potential value of this project is contingent upon such standardization as will make the electric attachments of fixtures completely interchangeable, and

Whereas failure to so standardize attachments would jeopardize the success of the project entailing untold inconvenience and confusion to the public, be it therefore

Resolved, that in the best interest of the public and of the lighting industry the Council hereby urge all concerned to co-operate to the fullest extent in bringing about complete interchangeability of removable lighting fixtures.

Branch Opened in Montreal

Owing to the rapid growth of their business in Eastern Canada, the Diamond State Fibre Company of Canada Limited, with head offices and works in Toronto, have found it necessary to open a branch office at 84 St. Francois Xavier Street, Montreal. Mr. J. Alexander Regan will be in charge of the Montreal office.



The two illustrations on this page show the pair of model windows erected by the C. G. E. Co. in their Wallace Ave. factory.

Can. Gen. Elec. Co. Entertain Electrical Dealers in Their New Wallace Avenue Factory

In order to stimulate the demand for "Made in Canada" electrical goods, the Canadian General Electric Co., Limited, invited the electrical dealers of Toronto to visit their new factory at Wallace Avenue. This factory is the latest addition to the ever-increasing chain of factories and sales branches.

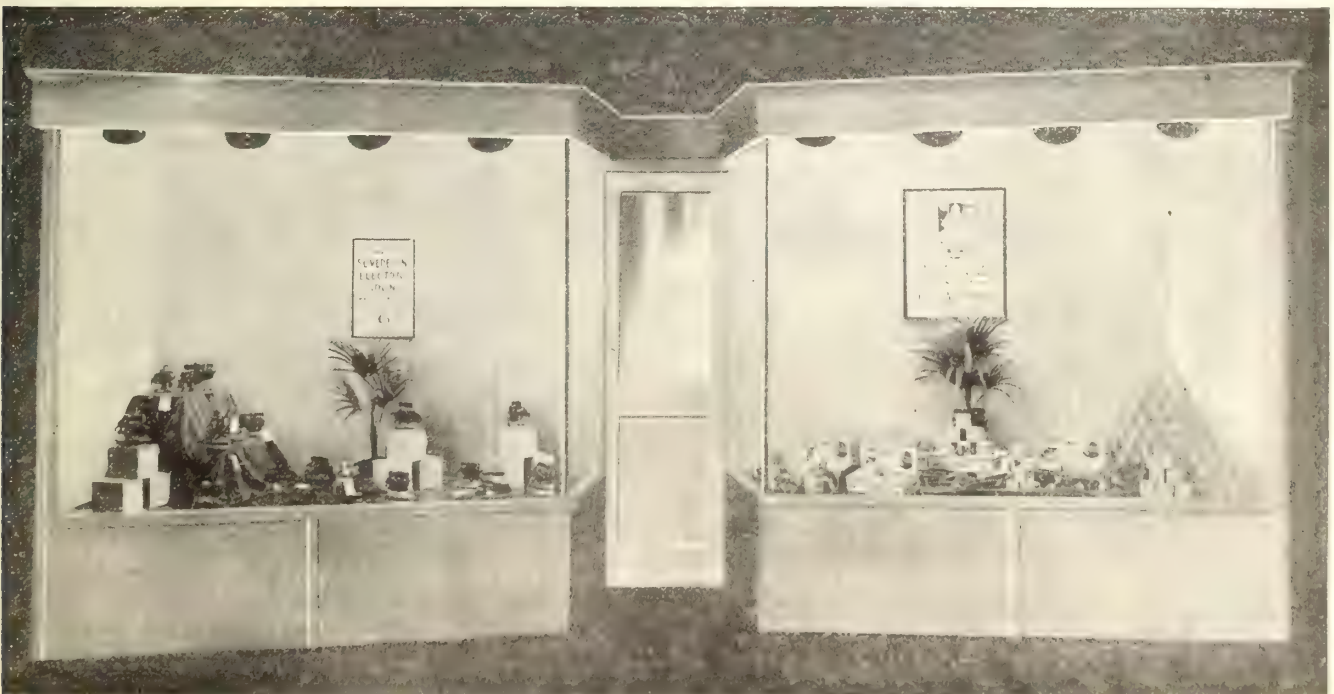
On arrival at the works the electrical dealers were conducted on a tour of inspection under the guidance of Mr. C. S. Mallett, general superintendent. Wiring devices of every description were shown in process of manufacture.

After passing through the different departments and arriving at the top floor, the dealers found themselves in the

spacious cafeteria, which is in operation every day for the benefit of the factory employees. Here, the dealers were entertained to a banquet and entertainment, the music being supplied by the factory orchestra.

One of the most interesting features was the pair of model stores erected in the cafeteria. The windows of these stores were dressed with C. G. E. electrical goods all "Made in Canada," the "single-idea" to a window being rigidly adhered to. A moving picture was also shown, illustrating the manufacture of Edison Mazda lamps in Canada.

Mr. C. S. Mallett in addressing the dealers pointed out that not only will we increase the value of the Canadian dollar across the line by buying "Made in Canada" electrical goods, but that we would materially help to decrease the cost of wiring devices, as it is only by increased production that prices can be brought down. The cost of labor is changing





The dealers were entertained in the cafeteria with banquet music and brief addresses.

very little, and the cost of raw material to-day in some instances is higher than ever. The dealers were also addressed by Mr. A. S. Edgar, manager Supply Dept.; Mr. Gordon Logan, assistant comptroller, and Mr. C. S. Barthe, manager Toronto Supply Sales Department.

What is the Best Name for Removable Lighting Unit?

The Society for Electrical Development, New York City, have requested us to publish the following item regarding a name for a new portable lighting unit as they consider this matter is of considerable importance at the present time:

Wanted: A Name

The advent of the removable lighting unit calls for a new name, one which should more appropriately describe it than the often abused term "fixture" by which the ceiling and wall lights have heretofore been known. A fixture as defined by Webster is something fastened in place or, in law, an article affixed to the freehold, and consequently confined to one place. No qualification of this word "fixture" can make it serve as an appropriate term to apply to the new lighting unit, for its use would signify permanency.

The Society for Electrical Development feels that the new name—and a new one will surely be forthcoming—should be discovered by one in the electrical industry and so invites the interest and co-operation of all in the search.

Chandelier will immediately suggest itself. This is a word derived from the noun chandler, signifying a dealer in candles, oil, soap, paint and groceries, and was used to designate the first lighting unit of which there is any mention, the seven branch lumiere of antiquity. Early French historians classified chandeliers as chandeliers mobile (movable units), chandeliers suspendus (hanging units) and chandeliers fixes (fixtures). Reference is also made that the

princes and gentletalk had to have mirrors that they could transport from their chateaux to the city, or from the city to the country. The need introduced small metal lamps fashioned so they could be carried from place to place. "Chandeliers suspendus" developed in lumieres and lustres, candelabra and girandoles. The wall bracket of to-day evolved from "appliques," lanternes, portatives or vivantes, became in time our modern lanterns.

These few references to lighting units of old have suggested "Lumieres Mobiles" and "Mobiliers" as appropriate names for the new units. Other suggestions have been "Portaliers" and "Removaliers." A few more have been Luminiers; Chatteliers; Chattelites; Elextures; Elexiliers. Slogans have been submitted, as well, among which are "Hang your light where it's right"; "Move your lights to suit your moods"; "Light right with right light"; "Hang your lights—don't fix them"; "Portoliers may be placed where you please"; "Your lighting is the mirror of your home"; "Luxury in light is in choice not in price"; "Place your light to light your place"; "Elexiliers are the essence of electric lighting."

It is questionable whether any of these will find general favor, so it is to be hoped that further suggestions will be forthcoming.

We regret to learn that Mr. McFadden, one of the Ontario representatives of the Diamond State Fibre Company of Canada, Limited, is in the hospital at Port Hope suffering from pleurisy. Mr. McFadden's friends will be wishing him a speedy recovery and return to business activity.

Messrs. Arthur & Conn, Argyle St., Halifax, N.S., have been awarded the contract for electrical work on a building that is being remodelled on Barrington St., Halifax, at an estimated cost of \$10,000.

National X-Ray Reflector Company Say "Largest Indirect Lighting Fixture Ever Built"

The largest indirect fixture ever built has recently been installed by the National X-Ray Reflector Co., in the Alhambra Theatre, Milwaukee. This enormous indirect unit is fifteen feet in diameter and contains 118 lamps; the main bowl containing 100 200-watt Mazda "C" lamps in X-Ray reflectors, and the lower bowl containing 18 60-watt lamps, the latter serving to light the large bowl and to be used in emergencies. The fixture is suspended by eight two-inch pipes twenty-five feet long and hangs in the center of the

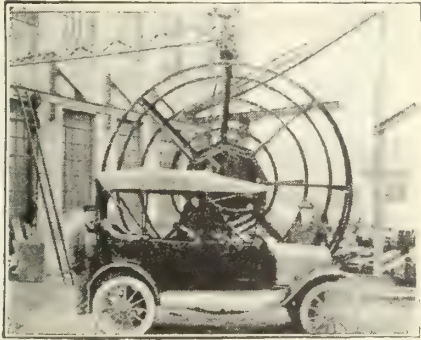


Fig. 1—The great fixture in construction showing the steel framework.

dome over the auditorium of the theatre. It weighs approximately 5,500 pounds and is finished in ivory and gold.

The auxiliary lighting in other parts of the theatre not affected by the central fixture is done by means of 16 smaller fixtures similar to the large one.

Cleaning

Directly above the fixture there is a hole large enough to permit a man to climb down a ladder into the bowl. Below the large bowl and part of the fixture is a smaller bowl. From this smaller bowl a cable can be lowered at the end of which is a leather outfit. By means of this, a man is hoisted to a position enabling him to clean the outside of the large bowl.

Colored lighting is the feature of the installation. In the central fixture the 100 lamps are divided into four groups; twenty-five each of red, blue, amber and white. The colors

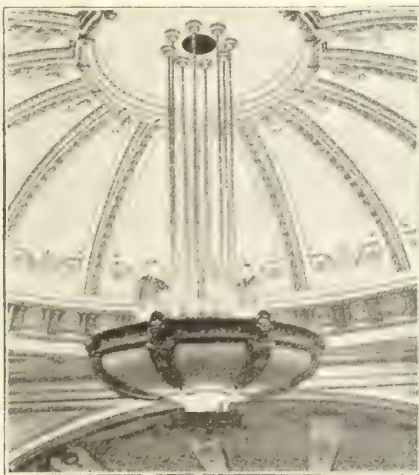


Fig. 2—Photograph showing the fixture installed.

are secured by natural colored cover glasses placed over the reflectors. In the smaller fixtures the same scheme is carried out.

Another interesting treatment of the lighting in the Alhambra is the floodlighting of the proscenium arch. This is

accomplished by means of twelve 1,000-watt lamps in special X-Ray equipment.

The National X-Ray Reflector Co. specializes in theatre lighting and have made several notable installations in the past few months that mark a new era in theatre lighting. Among these are the Tivoli Theatre, Chicago, one of the most beautiful and expensive theatres in America; the Ascher Brothers' New Palace Theatre, Peoria, Ill., where a crystal fixture nine feet in diameter and seventeen feet long, which embodies the principle of indirect lighting was the central piece; the Apollo Theatre, built by A. H. Woods at Randolph and Dearborn Streets, Chicago; as well as numerous others.

Toronto Contractors and Dealers Stage Useful Discussions at Monthly Meetings

The regular meeting of the Ontario Association of Electrical Contractors and Dealers, Toronto district, was held in the Board of Trade building on the evening of April 7. Following the usual 6.30 dinner a discussion was introduced on the subject of the relation of the jobber to the industrial plant that employs a staff for electrical purposes.

Correspondence which had taken place between the Toronto Hydro-electric System and the Association with reference to the collection of lighting accounts by association members was read and discussed. The Toronto Hydro-electric System did not appear to be favorable to the scheme and it was decided by the association that they would make this matter the subject of further negotiations. It was also decided to furnish the Toronto Hydro-electric System and the Toronto & Niagara Power Company with a list of the names and addresses of association members, with the suggestion that inquiries for wiring and repair work be reported to the member whose place of business is in the neighborhood of the applicant's premises.

Reference was made to the entertainment provided for members of the association by the Canadian General Electric Company during their recent visit to their new plant on Wallace Avenue. A vote of thanks was passed to the staff of the C. G. E. for this entertainment.

Discussion also took place on the proposed Standard Estimating Sheet and the competitive quotations on house wiring material. A final decision was deferred on the former question until the next meeting.

There was a good attendance of members as well as jobbers and manufacturers. Among the visitors were Messrs. Roach and Miller of the McNaughton-McKay Electric Company, Windsor, Ont.

Escolite a Popular Unit

The Electric Supply & Contracting Co., Limited, Vancouver, B.C., has recently completed a wiring contract for the Canadian Window Bakeries; other contracts that have been having the attention of this company are those of the Bank of Montreal and the Merchants Bank of Canada in both of which institutions they carried out a complete installation of the well-known Escolite Lighting Unit which is rapidly becoming popular in Western Canada.

The annual convention of the Illuminating Engineering Society will be held in Rochester, N.Y., during the week of September 26, 1921. Mr. Robert M. Searle, vice-president of the Rochester Gas & Electric Corporation, has been appointed chairman of the General Committee of the 1921 convention.

Mr. G. R. Allerton has been appointed acting advertising manager for the Northern Electric Co., Ltd., Montreal, in succession to Mr. D. J. Beatty, who has resigned to go into business on his own account.

Winnipeg Contractor-Dealers Endorse Slogan "Buy Electric Goods in Electric Store"

The campaign to "Buy Electric Goods at an Electric Store," which the Electrical News has been urging for some time, is meeting with almost universal favor among electrical men. As we have already pointed out, one of the largest Canadian manufacturers of electrical equipment has adopted this slogan and other manufacturers express themselves as entirely sympathetic with the idea. The one difficulty in the way of its universal adoption is, of course, that there are certain of the smaller towns where electrical stores do not exist. This condition, however, is gradually remedying itself and not only are electrical stores increasing in number very rapidly but the methods of merchandising are improving by leaps and bounds. Just as soon as the electrical industry is in a position to take care of its own merchandising the reasonableness of buying electric goods in electric stores will automatically appeal to the public. The force of the whole industry in the meantime should be concentrated on perfecting our merchandising methods.

As an indication of the viewpoint held by the average electrical man, we quote a letter just received from the president of the Electrical Contractor-Dealers' Association in Winnipeg, Mr. L. B. Dickson. Mr. Dickson says that this slogan is "heartily endorsed by the members." His letter follows:—

Winnipeg, April 6.

Editor, Electrical News:—

Beg to advise you that at the last regular meeting of the Electrical Contractor-Dealers' Association, held March 23rd, your slogan, "Buy Electric Goods at an Electric Store," was brought up for discussion and heartily endorsed by the members.

Electrical Contractor-Dealers' Association,
L. B. Dickson, President.

Hoover Announces Improved Models for 1921

A number of refinements in the Hoover suction sweeper are announced by the manufacturers. These are the results of extensive research among Hoover owners and in the laboratories of the company, and will make the operation of the cleaners more convenient and efficient than heretofore. The application of the basic Hoover cleaning principle of beating and sweeping combined with suction is in no wise changed. The sole object of the changes is to improve the Hoover's efficiency and convenience of operation in the hands of users.

Among the improvements to be incorporated in the 1921 Models are the following:

A new bearing for the brush has been adopted which needs no oiling, which is noiseless, and which cannot "freeze" on the shaft regardless of climatic conditions. This new feature allows the machine to operate at uniform speed and efficiency under all kinds of weather.

Another excellent feature is the new type tilting bar, located on the left side of the handle bail. This bar is operated by user's toe and provides three separate ranges of position for the handle without the operator having to stoop to shift the handle from one range to another.

Changes have been made in the method of attaching the wooden handle to the handle bail which will insure the handle being locked in the correct position. Never can the cord winding clips and the bag slider bar get out of alignment. The tapered end of the handle is provided with a metal pin which fits into a slot in the socket. Thus the handle can only be inserted in the proper way and cannot be turned thereafter.

Another improvement is a longer bag slider bar which guards the dirt bag from strain or pull and consequent injury.

Still another feature which will be most valuable from an

operating standpoint is a strain relieving feature for the cord.

Other changes include the substitution of die castings for sand castings for use on the fan and brush.

Want "Interchangeable" Feature

The executive committee of the National Association of Electrical Contractors and Dealers recently passed the following resolution:

"Resolved, that the executive committee of the National Association of Electrical Contractors and Dealers are opposed to the development by manufacturers of any detachable fixture device unless the same be fully interchangeable."

Mr. W. H. Morton, general manager of the National Association, advises us that the feeling of the committee was that the development and marketing of several detachable fixture supports that were not interchangeable would be of serious detriment to the industry—causing expense, inconvenience and annoyance to both the seller and the user of such devices. On this account, they felt that it would be better not to have any such device produced unless it could be produced by concerted action on the part of the manufacturers, resulting in any devices that were put on the market being entirely and fully interchangeable.

G. L. MacGillivray Co. Ltd.

Mr. D. J. Beatty, formerly advertising manager for the Northern Electric Company, has resigned to go into partnership with G. L. MacGillivray in the G. L. MacGillivray Company, Limited. This company was recently formed to look after the selling interests of the following firms in Eastern Canada: Edwards & Company, Inc.; American Insulator Corporation; Waterbury Manufacturing Company; Chase Metal Works; Parker Supply Company, Inc.; R. M. Radio Company of London, Eng.; The Prometheus Electric Co. For some time prior to enlisting for overseas service, Mr. Gordon MacGillivray was assistant supply sales manager for the Northern Electric Company at Montreal.

Lighting System for Montreal West

The Northern Electric Company have been awarded a contract for a lighting system for the town of Montreal West, from plans prepared by Mr. F. B. Brown, of the firm of Walter J. Francis & Co., Montreal. There will be four circuits with constant current transformers. Mazda lights will be mounted on cast-iron ornamental pedestals, these totalling about 280, sufficient to light all the streets. The current will be supplied by the Montreal Light, Heat & Power Consolidated at 2,200 volts. The cables will be laid in underground trenches and will be of the steel tape armored type. It is expected that the system will be in operation by the fall.

Electric Steel Smelting in Chatham

The electric steel smelting plant which has been undergoing installation by the Chatham Hydro-electric System during the past year is now being started in operation. This plant will be operated along lines originated by Mr. J. G. Jackson, manager of the Chatham System, and will utilize off-peak power, principally at night. The furnace and regulators were furnished by the Volta Manufacturing Company of Welland.

Mr. A. J. Nesbitt, of Nesbitt, Thompson & Co., Ltd., has been elected a director of the Laurentide Power Co. Mr. Nesbitt is also a director of the Southern Power Co., and the Winnipeg Electric Railway Co.

Vancouver Electrical Contractor-Dealers Give Banquet to M. K. Pike

On Tuesday, the 5th of April, a very interesting evening was spent in the Citizens' Club, Vancouver, B.C., the purpose being to extend a hearty welcome to M. K. Pike, general sales manager of the Northern Electric Company, who was on a short visit to the west.

Invitations were confined almost exclusively to contractor-dealers and almost every firm in the city was represented.

The chair was taken by W. W. Fraser, the new president of the Vancouver Electrical Contractor-Dealers' Association, on the right of whom sat Mr. Pike, whilst on the left sat Mr. W. G. Murrin, assistant general manager of the B. C. Electric Railway Company.

A sumptuous repast being concluded, Mr. Fraser in a few well-chosen words told the guests the object of the meeting, and then called on Mr. E. Brettell, past president of the association. This speaker dwelt extensively on the splendid work Mr. Pike was doing for the good of the contractor-dealer, and then presented Mr. Pike with a handsome illuminated address which had been voluntarily subscribed for by members and which read as follows: "We, the electrical contractor-dealers of the city of Vancouver extend a very hearty welcome to you on your visit to our city.

"We realize that conditions in our section of the business are slowly but steadily improving, a fact which is very largely due to the splendid and unselfish work you are doing throughout the Dominion of Canada.

"That you may continue to enjoy good health to carry on this work is the sincere wish of all."

In conclusion, Mr. Brettell expressed the hope that the address would hang in Mr. Pike's office in Montreal as a reminder that the electrical contractor-dealers in the west appreciated the good work he was doing.

The next speaker was Mr. W. G. Murrin, assistant manager of the B. C. Electric Railway Company, who is also vice-president of the B. C. Electrical Co-operative Association. Mr. Murrin dwelt at length on the great progress that was being made and assured those present that the Power Company was solidly behind the movement.

Mr. Fraser added a few words of welcome to Mr. Pike and the singing of "For He's a Jolly Good Fellow," followed by "God Save the King," brought a very successful evening to a close.

Electrical Co-operative Luncheon

On March 30th, Mr. Pemberton Smith gave a very interesting address on "Old Montreal" at the Electrical Co-operative Luncheon, Montreal. The speaker briefly reviewed the early history of the country, and the founding of Montreal. Then he traced the growth of the city as it expanded outside the old town walls. According to the speaker, the Chateau de Ramesay was the greatest drawing card the city now possessed for tourist travel. The out of town guests included Messrs. S. L. B. Lines & W. Volkman, Toronto; Mr. L. J. Bevan, New York; J. T. Dorey, Halifax; C. E. Brazeau, Joliette; C. R. Spence, St. Hyacinthe.

Marchand Electrical Co. Very Busy

The Marchand Electrical Company, Ottawa, have recently completed the following contracts,—Government Printing Bureau, Isolation Hospital, Ottawa University, Banque Nationale Building, Bowles' Lunch. They still have under construction the Ottawa General Hospital, Water St.; R. C. Church, St. Andre Avelin, Que., and the Maternity Hospital, Cambridge St. Ottawa.

Miscellaneous

Mr. P. Rochon, 84 Royale St., Three Rivers, Que., has been awarded the contract for electrical work on a store and tenement building being erected on Badeaux St., Three Rivers.

Mr. N. Montplaisir, Cap de La Madeleine, Que., has been awarded the contract for electrical work on a residence being erected at Rue Rocheleau, Cap de La Madeleine, for Mr. Philippe Comeau.

The Sun Electric Company, 1842 Scarth St., Regina, Sask., has been awarded the contract for electrical work on a building that is undergoing alterations on the corner of Hamilton and South Railway Sts., Regina, for the Ryan Motors, Ltd.

The Master Electric Company, Dayton, Ohio, are distributing bulletin No. 20 describing Master motors in fractional horse-power sizes from 1/10 to 1/2 h.p. The bulletin is well illustrated and describes in detail the construction of this motor.

The Keewatin Lumber Company, of Fort Frances, Ont., which is controlled by the Backus interests, are installing hydro-electric units of approximately 3,500 kv.a. capacity at the Kenora power plant, which was recently sold to the Backus interests.

The Fulton Iron Works, St. Louis, Mo., have issued an illustrated bulletin, No. 801, describing Fulton Diesel Oil Engines. This is a booklet well illustrated and describing in detail the construction of these engines. It will be sent on application to the above company.

The Ward Leonard Electric Company, Mt. Vernon, N. Y., are distributing a number of interesting folders describing Vitrohm Speed Controllers, Ward Leonard Small Circuit Breakers, etc. Another interesting folder, Circular 503, describes this company's 32-40 volt plant accessories.

The Westinghouse Electric & Manufacturing Company has placed upon the market a new electric iron, known as the Type H. Service and utility are the features of this iron, and because of its sturdy construction the user is assured of long and satisfactory service. Perfect balance, a comfortable handle, a quick-detachable plug and a carefully constructed heating element make for perfect ironing utility.

In the March 1 issue of the Electrical News, page 51, a description of the A B C Electric Ironer, manufactured by Altorfer Brothers Company, Peoria, Ill., is given and the statement made that the Quebec agents of this company are the Duncan Electric Co. This was an error and should have read Dawson & Company, Ltd., Montreal. Mr. C. D. Henderson, Brantford, Ont., is the Canadian distributor for Altorfer products.

Norman M. Campbell, managing director of the General Combustion Company of Canada, Limited, has made arrangements, on behalf of his company, with T. H. Watson & Company, of Sheffield, England, to build and sell their various electric furnaces, which includes the Canadian rights for the Greaves-Etchells type of furnace. He has also made arrangements whereby the General Combustion Company of Canada, Limited, has taken over the design of the Electric Furnace Construction Company of Philadelphia.

Electric Railways

Regina Also Finds One - Man Safety Car Effects Saving in Operation

We are in receipt of an interesting report on one-man car operation in Regina, Sask., from Mr. D. W. Houston, superintendent of the Regina Street Railway Department. Mr. Houston has been a very consistent advocate of the one-man safety car for many years but until very recently was unable to induce the citizens of Regina to allow him to make a test. The success of the trial, as told in Mr. Houston's own words, is just another evidence of the value of the one-man safety cars where conditions are favorable for their operation, which seems to be in practically every small sized city. Mr. Houston writes as follows:—

"We introduced our one-man operation on the line where traffic and general operation conditions are most difficult. It took some time for the operators and passengers to get familiar with the cars, but they are now running smoothly and efficiently, giving the same service with the same number of cars as when operated by two men.

"The cars used are double truck similar to the Calgary cars and have been remodelled in accordance with the McCauley patents. We reproduce a picture of the first remodelled car, taken just previous to its initial trip. The operator is standing just in front of the entrance door which opens outward. The exit door folds inward.

"On March 30th I made a report to City Commissioner Thornton re one-man cars as follows:—

"On March 6th we commenced one-man operation on the Blue Line (Winnipeg and Thirteenth) with the three regular cars and on the 15th we changed to one-man on one of the rush cars and on the 17th on the other. We started one-man operation on the College Line, March 14th.

"These cars have not been in service long enough for the operators and passengers to get fully used to them, but from close personal observation of their operation I am able

to report that they can and do give the same service on the same schedule as the two-man cars. This has been particularly noticeable since the beginning of the present week. During the past two weeks there have been some breaks in the service and some congestion especially during the evening peak. Part of this has been due to the operators and general public adjusting themselves to this type of car and part due to an occasional breakdown not due to one-man operation. Delays due to defects developing in individual cars have occurred as much on other lines as on the Blue and are more or less unavoidable considering the many parts of a street car that have to be kept in good condition.

"In addition to a double-end car for the College Line we have remodelled six double-truck cars at an average cost of \$374.50 each for labor and material. At the present time we have two single truck cars in the shop being remodelled for operation on the White Line. We expect to have these ready for service by the end of this week. While in this report I wish to emphasize the fact that we are able to give satisfactory service car for car by one-man operation. I would also point out that the present service on the Blue Line is costing daily in platform expense \$50.86, as against \$84.42 for two-man operation, a saving of \$33.56. The daily saving on the College Line is \$4.50. Up to and including the 29th inst., the total saving by one-man operation was:

Blue Line	677.39
College	58.50
Total	735.89

"As compared with the other lines the Blue Line is the most difficult to operate successfully and smoothly.

"The bulk of the patronage is from and to points along 13th Ave. west of Albert St., where we have 16 possible stops to the mile and over 63 per cent. of the way it is single track. Then in the east end of this line there are several trips a day to be made to the Imperial Oil plant and two steam road crossings to be flagged every half trip with possible delays from switching trains on the C. P. Railway."

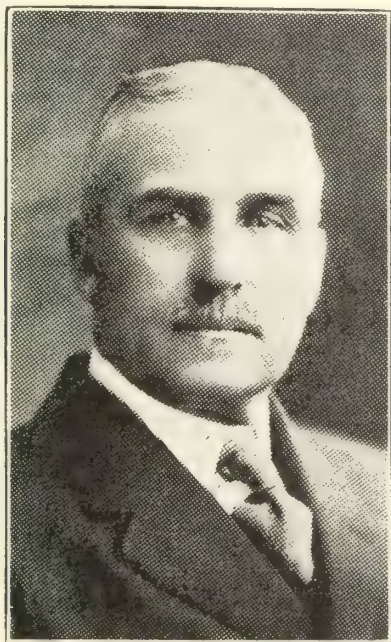


One-man Safety Car in Regina. From left to right—Mayor, Jas. Grassick; Alderman Peart; Alderman Froom; Commissioner Thornton; Alderman Dawson; Alderman Burton; Supt. D. W. Houston; Asst. Supt. McGuinness; Operator R. Baldwin; Master Mechanic Baxter

New Manager for W. E. Ry. Co.

Mr. John Whitsell was appointed manager of the Winnipeg Electric Railway Company on the 16th of March, 1921. He comes into the organization of the company with many years of practical experience, and a record of successful administration of important transportation companies in large cities. The position he held prior to coming to Winnipeg was that of general superintendent of the Chicago and Inter-urban Traction Co.—one of the most important traction systems in Chicago, and one of the companies under the same management as the Chicago Elevated, the North Shore Railroad, and other lines.

Mr. Whitsell is a man of pleasing personality, and was immediately accepted by the organization which he has joined



Mr. John Whitsell

with a feeling of confidence and good-will. He began his career in the electric railway industry in 1891, when he entered the car service department of the Sioux City Traction Company. In 1897 he joined the Suburban Railway Co. of Chicago, and won promotion to the rank of master mechanic, and then of general superintendent. The company was merged with the County Traction Co., Chicago, and in 1913 he was appointed general superintendent of transportation and shops. In 1913 this company was reorganized and named the Chicago and West Towns Railway, and Mr. Whitsell was appointed to the position of general superintendent. On May 5th, 1920, he accepted a similar position with the Chicago and Inter-urban railway, holding this position until his removal to Winnipeg.

A Comparison in Emergency Stops

The following distances are required for emergency stops for street cars and automobiles:

Speed in Miles per hour	For Street Car	For an Automobile
8	63 feet	8 feet
10	70 "	10 "
12	78 "	13 "
14	90 "	17 "
16	105 "	22 "
18	125 "	29 "
20	150 "	38 "

In cases of slippery rail the street car cannot do even as above, and in cases of skiddy streets the automobile may do worse.—Ontario Safety League.

British Tramway Officials Say "Overhead System Still Has No Rival"

British tramway officials, those of municipal as well as of company-owned systems, with wide experience in the operation of various types of vehicles, maintain the easy supremacy of the overhead method (trolley) as against other types. Councillor Kelly, convenor of Glasgow corporation tramways, briefly expresses his conviction in these words:

"We are all convinced that the overhead system still has no rival."

At a recent meeting of the Bournemouth tramways committee the general manager submitted a report comparing the carrying capacity and the costs of tramway and motor omnibus service. The figures given are as follows:

	Cost	Life	Seats Per Mile	Cost Per Passenger
Omnibus....	£1,800	5 yrs.	38	26.39d
Tramcar....	£3,000	15 yrs.	64	12.91d

With these facts before them the committee said it could not recommend entertaining the suggestion that street cars be discarded in favor of the busses.—W. E. R. Service News.

Montreal Tramways Co. Have Big Building Programme

The Montreal Tramways Company have decided on a large construction programme for this year. New lines will be built on Park Avenue, from Atlantic Avenue to Ball Street; an extension on Kelly Street; and a line from Cote des Neiges Road to the Park Rangers' house on Mount Royal. Many sections of the system are to be renewed, the company working as far as possible in co-operation with the roads department of the city, in order to prevent duplication in tearing up the roads.

The street railway commission, at a recent meeting held in Brantford, Ont., made provision for the construction of a loop through the St. Paul Avenue subway. The loop will link up part of the main line system with the Terrace Hill branch.

Reports state that the Grand River Railway Company is making preparations to inaugurate a through trip between Port Dover and Kitchener by running through cars from Kitchener to Port Dover, eliminating the change of cars now necessary in Galt. The company also plans the erection of a station on South Queen Street to take care of traffic after they discontinue service on King Street.

The street railway employees of London, Ont., are asking the company for a wage scale of 52 cents an hour, to be effective May 1st. The present agreement of 48 cents an hour expires April 30th. Reports state that the company will not accede to the request.

The Railway Committee recently reported favorably on a bill which will authorize the London & Lake Erie Railway & Transportation Company to dispose of its property and equipment. The line has discontinued operation.

The legality of an increase in fares from five to seven cents on the street railway, Peterborough, Ont., is questioned by Mr. T. Tooms, M.P.P. for West Peterborough, who has instituted an inquiry. He believes that the increase is contrary to the provision of the railway's franchise and that the matter should first have been submitted to the people.

The Fort William electric railway system are painting their street cars with green paint instead of yellow, as formerly.

Current News and Notes

Brantford, Ont.

Due to the breakdown of two transformers in the Hydro-electric power plant, the town of Brantford, Ont., recently was without lights on the streets for about a week.

The Ontario Gazette announces the incorporation of the Thermo Electric, Limited, with head office at Brantford, Ont., for the purpose of carrying on the manufacture and sale of any class of goods, and particularly those of an electrical nature, and to acquire the business formerly carried on under the firm name of Canadian Electrical Products Company, Brantford. The company is capitalized at \$60,000.

Construction work for the Hydro-electric System, Brantford, Ont., which includes an addition to the sub-station, the addition of new machinery and the re-stringing of 90 miles of wire, awaits the approval of the Ontario Hydro-electric Commission of a by-law covering this work.

Brockville, Ont.

Messrs. A. G. Dobbie & Co., Brockville, Ont., have secured the contract for electrical work on an I.O.O.F. temple that is undergoing alterations at Gananoque, Ont.

Bull Harbor, B.C.

The site has been cleared and work will start at once on the erection of a wireless station at Bull Harbor, Vancouver Island, B.C., for the Dominion Government. The work will be under the supervision of Supt. E. J. Haughton, 1230 Government St., Victoria, B.C.

Cap De la Madeleine, Que.

Mr. N. Montplaisir, Cap De la Madeleine, Que., has secured the contract for the electrical work on a convent building being erected in that town at an estimated cost of \$80,000.

Charlottetown, P.E.I.

Mr. Courtland Hopkins, 87 Sydney St., Charlottetown, P.E.I., has been awarded the contract for electrical work on a residence that is being remodelled for the Lowden Estate, Charlottetown.

Chatham, Ont.

The Chatham Public Utilities Commission have issued an interesting report for the year 1920, signed by J. G. Jackson, secretary-treasurer and manager. During the past year domestic consumers have been increased 135%, commercial consumers 104% and power consumers 129%. The total revenue from the sale of current to these three classes of consumers showed an increase of 81% over 1919. The largest increase is shown by domestic consumers—171%—due largely to the increased use of electric appliances and electric ranges, the latter of which now number 300 in the city of Chatham.

Cobalt, Ont.

The power situation in Northern Ontario has been greatly improved as a result of the spring break-up. It is stated that the McIntyre Porcupine mines, together with the Hollinger and Dome mines, had their supply almost doubled recently. Some time ago the power had been cut to about 35 per cent., but it is now up to about 70 per cent. of normal.

Cranbrook, B.C.

A new power plant for the C.P.R. at Cranbrook, B.C., has recently been completed. Mr. A. Chitty, of Vancouver, had charge of the installation.

Edmonton, Alta.

Bert L. Perry, Ltd., 102nd St., Edmonton, Alta., has secured the contract for electrical work on an addition being built to the Royal Alexandria Hospital, Edmonton, at an estimated cost of \$287,000. The above company will receive \$11,851 for their work.

Fredericton, N.B.

It is stated that the city of Fredericton, N.B., will enter into a five-year agreement with the Maritime Electric Company, Ltd., for that company to light the city streets at the rate of five cents per kilowatt hour, the agreement to be cancelled on one year's notice by either party.

Guelph, Ont.

It is announced that the city of Guelph, Ont., now being entirely free of debt to the Hydro-electric System, will consider the question of increased street lighting and the increased use of electrical appliances in the homes of the citizens. Mayor Burgess believes that the use of electric stoves would be largely increased if some financial assistance could be offered to the average small householder.

Halifax, N.S.

The Maritime Telephone & Telegraph Co., Hollis St., Halifax, N.S., will receive tenders up to April 16th on a telephone exchange building to be erected at Berwick, N.S.

Cragg Bros., Ltd., Barrington St., Halifax, N.S., have been awarded the contract for electrical work on a residence recently erected on Westmount St., Halifax, for the Eastern Investment Corporation.

Hamilton, Ont.

Mr. H. C. Page, 307 Wentworth St. S., Hamilton, Ont., has secured the contract for electrical work on a Sunday school building soon to be erected for the Chalmers Presbyterian Church, Hamilton, at an estimated cost of \$25,000.

Invermere, B.C.

The Department of Public Works, Ottawa, it is stated, will include in this year's supplementary estimates an appropriation for the extension of the Dominion Government telephone system from the present terminus at Fairmont Springs, B.C., to Wasa, B.C. It is believed the extension will be completed this year.

Keremeos, B.C.

Mr. G. W. Cole, Keremeos, B.C., has been awarded the contract for electrical work on a building being erected on Seventh Ave., Keremeos, for a cafe and apartments.

Kitchener, Ont.

Messrs. Ellis & Howard, 11 Queen St. N., Kitchener, Ont., have secured the contract for electrical work on a bank building on the corner of King and Foundry Sts., Kitchener, which is undergoing alterations at an estimated cost of \$30,000.

London, Ont.

The Winegarden Company, 64 Dundas St., London, Ont., have secured the contract for electrical work on a building that is being remodelled for the London Loan Company, 220 Dundas St., London, at an estimated cost of \$15,000.

Mr. E. V. Buchanan, general manager of the London Public Utilities Commission, is reported to be installing a wireless telephone system connecting the waterworks pump-

ing station at Springbank with the Hydro sub-station and the head office of the Commission.

Montreal.

Mr. Charles DesBaillets, former chief engineer of the city of Sherbrooke, Que., but now engineer-in-charge of the Montreal Water Board, recently addressed the Montreal branch of the Engineering Institute of Canada, describing technical features of the hydro-electric development in the neighborhood of the city of Sherbrooke.

The Western Quebec Power Company, Ltd., has been formed to take over the North River Electric Company, Ltd., and the Vaudreuil Electric Co., Ltd. These two companies distribute power in Montreal suburbs, being described as forming a half circle southwest of Montreal Island at an average distance of forty miles from the city of Montreal.

The Hart Battery Company, Ltd., has been formed to take over the entire assets and liabilities of the Canadian Hart Accumulator Company, Ltd.

Montreal West, Que.

The Northern Electric Company, Ltd., 121 Shearer St., Montreal, have been awarded the contract for the installation of a new electric lighting system at Montreal West, Que., at an estimated cost of \$117,000.

Niagara Falls, Ont.

The Central Electrical Company, Victoria Ave., Niagara Falls, Ont., have secured the contract for electrical work on residences being erected on Maple St., Niagara Falls, for Mr. W. L. Duncan.

Oil Springs, Ont.

Work is expected to start shortly on an \$8,000 hydro-electric system at Oil Springs, Ont. A by-law has been passed by the town council and the matter is before the Hydro-Commission for approval.

Ottawa, Ont.

The Hydro-electric Power Commission of Ottawa, Ont., have recently purchased the property, which was formerly leased by them, at the corner of Bank and Albert Streets, Ottawa, for the sum of \$47,500.

Mr. E. Headley, 645 Echo Drive, Ottawa, Ont., has been awarded the contract for electrical work on a residence being erected on Renfrew Avenue, Ottawa, for Mr. W. H. Lee, 58 Glen Avenue.

The Ferranti Electric Co., Ottawa, Ont., have been awarded a contract by the Ottawa Hydro-electric Commission for electric meters.

The Canadian General Electric Co., 180 Queen Street, Ottawa, Ont., have secured the contract for a number of transformers from the Ottawa Hydro-electric Commission.

Ahearn & Soper, Ltd., 56 Sparks St., Ottawa, Ont., are supplying the Ottawa Hydro-electric Commission with a quantity of copper wire.

The Ottawa Hydro-electric Commission received tenders up to April 15 for three oil-cooled 11,000 volt transformers and three induction type 30 kw. regulators.

Penticton, B.C.

The Penticton Electric Company, Penticton, B.C., has been awarded the contract for electric work on a residence being erected for Mr. T. Gayeley, R.R. 1, Penticton.

Messrs. Menzie & Adams, Penticton, B.C., have been awarded the contract for electrical work on a residence being erected on Fairview Ave., Penticton, for Mrs. E. F. Park.

Preston, Ont.

The citizens of Preston, Ont., are considering the question of ornamental street lighting in the business section of

the town, and recently called a mass meeting to go into the matter of costs, etc.

Quebec, Que.

It is stated that one of the finest wireless receiving stations in Canada is situated in the laboratories of the Commercial Academy, Quebec, Que. Messages are regularly heard from France, Germany, Norway, Hawaii and other far distant places.

St. Catharines, Ont.

Mr. J. Jones, 19 Antwerp St., St. Catharines, Ont., has been awarded the contract for electrical work on a residence recently erected on George Street, St. Catharines, for Mr. H. Smith.

Mr. A. B. Cudney, St. Catharines, Ont., has been awarded the contract for electrical work on a residence recently erected at 24 Grantham Ave., St. Catharines, for Mr. E. Bird.

St. Sylvere, Que.

Mr. J. L. Janelle, St. Sylvere, Que., is secretary-treasurer of a new telephone company which is asking for prices on all material required on a contemplated telephone line.

Sarnia, Ont.

The Ontario Gazette announces the incorporation of The Smith Electric Company, Ltd., with head office at Sarnia, Ont., for the purpose of manufacturing and dealing in electrical appliances, electrical machinery, etc., and to acquire the business formerly carried on by the Smith Electric Company, Sarnia. The company is capitalized at \$40,000.

The Smith Electric Company, Ltd., Sarnia, Ont., have secured the contract for electrical work on a residence that is being remodelled on Christie Street, Sarnia, for Mr. F. Nelson.

Sault Ste. Marie, Ont.

The Greenwood Electric Co., Sault Ste. Marie, Ont., have been awarded the contract for electrical work on an addition that is being built to the High School in that place.

Sherbrooke, Que.

Mr. J. A. Choquette, 125A King St. W., Sherbrooke, Que., has been awarded the contract for electrical work on a \$15,000 residence being erected on Montcalm St., Sherbrooke, for Mr. J. C. Cote, 63 Frontenac St.

Sydney Mines, N.S.

It is reported that owing to certain grievances the company supplying electric current to the town of Sydney Mines, N.S., had cut off the current, resulting in the closing down of all shops requiring electric energy.

Thorold, Ont.

At the annual meeting of the Niagara District Hydro Radial Railway Union, recently held at Thorold, Ont., a motion was carried that the municipal councils of the Niagara district be asked to send a delegation of municipal representatives, covering the entire district, to interview the Minister of Railways and Canals, Ottawa, with a view to receiving his consent to negotiate with the municipalities interested in the operation of the N., S. & T. Railway for the purchase of that railway's assets, without the provincial guarantee.

Three Rivers, Que.

Mr. J. L. Plamondon, Three Rivers, Que., has secured the contract for electrical work on an \$8,000 tenement building recently erected on St. Francois Xavier St., Three Rivers, for Mr. Patrick Parenteau.

Toronto, Ont.

A Board of Conciliation has been established by the Minister of Labor to settle wage differences which have

arisen between the Toronto & York Radial Company and its electrical workers.

The Parsons Electric Co., 135 Essex St., Toronto, have been awarded the contract for electrical work on a residence which is to be erected in Moore Park, Toronto, for Mr. H. I. West, 43 Victoria St., at an estimated cost of \$20,000.

The township of York, Ontario, recently sold a \$200,000 6% bond issue to the Dominion Securities Corporation. The monies derived from this issue are to be used for Hydro-electric purposes throughout the township.

Mr. W. H. Winter, Montreal, General Superintendent of Plants for the Bell Telephone Company, at the annual banquet of the Bell Telephone Company Employees' Association held recently in Toronto, presented Mr. William Love with a parchment provided by the Royal Canadian Humane Society for rescuing a fellow employee from electrocution last September.

The Ontario Gazette announces the incorporation of Earle Electric, Limited, with head office at Toronto, for the purpose of manufacturing and dealing in electrical goods, to do electrical contracting and to acquire the business formerly carried on under the name of Earle Electric, in the city of Toronto. The company is capitalized at \$50,000.

The Cook Power Company, Limited, as announced by the Canada Gazette, has been incorporated with a capital of \$200,000, with head office at Toronto, Ont.

The Danforth Electric Co., 566 Danforth Ave., Toronto, have been awarded the contract for electrical work on two residences recently erected at 170 and 172 Glenmount Park Road, Toronto, at an estimated cost of \$20,000.

The Henderson Electric Co., 162 Bay St., Toronto, has been awarded the contract for electrical work on an addition that is being built to a store on the N. W. corner of Yonge and Dundas Sts., at an estimated cost of \$40,000.

W. J. Clarke, district plant superintendent for the Bell Telephone Company in Toronto, who has been with the company in Toronto for 38 years, has retired. He is to be succeeded by Alex. P. Ross, who was with the company in Toronto in 1898.

Vancouver, B.C.

Messrs. Farr, Robinson & Bird, 546 Howe St., Vancouver, B.C., have been awarded the contract for electric fixtures for a bank building which is undergoing alterations at the corner of Main and Broadway Sts., Vancouver.

Mr. W. A. Kruse, 12 Hastings St. E., Vancouver, B.C., has been awarded the contract for electrical work on an office building which is to be erected at 839 Hastings St. W., Vancouver, at an estimated cost of \$50,000.

Messrs. Farr, Robinson & Bird, 546 Howe St., Vancouver, B.C., have been awarded the contract for electrical fixtures for a bank at the corner of Cambie and Hastings Sts., Vancouver, the lighting system of which is being remodelled at a cost of \$2,500.

Victoria, B.C.

It is said the Railway Department of the Provincial Government, Victoria, B.C., will spend \$160,000 on the electrification of ten miles of the P. G. E. between North Vancouver and Whytecliffe, B.C.

The British Columbia Electric Railway Company will receive a grant of \$400,000 from the government of the province of British Columbia toward defraying the cost of making alterations to trackage, rolling stock and equipment made necessary by the change of the rule of the road in that province. Heretofore the rule has been to the left.

The Murphy Electric Co., Sayward Block, Victoria, B.C., has been awarded the contract for electrical work on a residence recently erected at 1406 Ivy St., Victoria.

Windsor, Ont.

Mr. F. D. Reaume, 609 Pierre Ave., Windsor, Ont., has secured the contract for electric wiring and fixtures for a school building being erected on Bruce Avenue, Windsor, at an estimated cost of \$240,000.

Homer N. Heard, formerly plant chief of the St. Thomas branch of the Bell Telephone Co., has been moved to succeed J. H. Wettlaufer, plant chief at Windsor, who resigned recently after 21 years' service with the Bell Telephone Co.

Winnipeg, Man.

The Winnipeg Electric Company recently opened a new sub-station on Sherbrook St., Winnipeg. This is the last of a number of sub-stations the company have erected at various points in Winnipeg to mitigate electrolysis conditions. By an agreement with the city of Winnipeg this additional equipment was promised to prevent continuance of damage to the city water mains.

A sleet storm passing over Manitoba and northern Ontario recently did considerable damage to telephone and telegraph wires. In the province of Manitoba, it is said, damage to the extent of \$200,000 was done to the telephone system alone.

KEEP THESE DATES OPEN

The Thirty-first Annual Convention of the
CANADIAN ELECTRICAL ASSOCIATION

Will be held in Quebec City on the

15th, 16th, and 17th of June, 1921

**HEADQUARTERS WILL BE AT THE CHATEAU
FRONTENAC**

The Programme Will be Announced Later

EUGENE VINET,
601 Power Bldg., MONTREAL Sec'y.-Treas

Will Supply Energy to Whole Island

The Prince Edward Island Light, Heat & Power Company has asked for incorporation in the local legislature, which is meeting at present in Charlottetown. The capital stock is \$2,000,000 and it is planned to supply light, heat and power to all parts of the island from one big central power house, using coal to generate electricity. The incorporators include Mr. H. A. Sanders, London, Eng.; Mr. N. A. Timmins, Montreal; Mr. John A. Bennan, electrical engineer, Chicago; Mr. W. J. O'Leary, electrical engineer, Montreal, and Mr. J. J. Hughes, ex-M.P., Charlottetown.

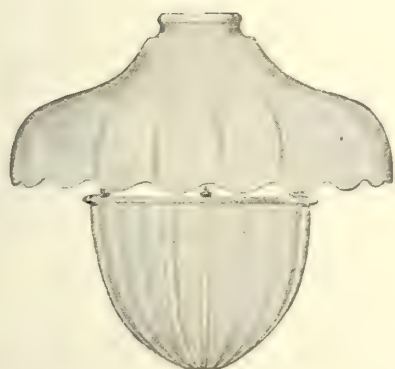
The Ohio Brass Company, Mansfield, Ohio, are distributing an interesting solder describing their new Wilson Plastic-Arc Rail Bond Welder. This is claimed to be a machine which includes the most progressive ideas in the welding art, fitted in with the conditions surrounding rail bonding and track work. By an accurate current controlling system, the inexperienced operator is enabled to use the proper methods—a short arc with uniform heat in the weld. The controlling apparatus thus prevents careless and imperfect work. The machine is a dynamotor type using the metallic arc process and is made for two voltages, 350 to 440 d.c. and 175 to 350 d.c. In addition to track work this welder is useful for general repair and shop welding.

Luna Glass Commercial Units



**Wired Complete for use
with Nitrogen Lamps**

Luna Glass is pure white and of uniform density, free from specks and imperfections.



It is the perfect glass for store lighting fixtures.

We show a full range of sizes in Combination Reflector and Bowl Fixtures, wired complete, ready to hang.



Portable Lamps

Floor Lamps

Semi-Indirect Fixtures

Shower and Candle Fixtures

*Electrical Glassware
and Sundries*

NERLICH & CO.

146-148 FRONT ST. WEST TORONTO

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1.
Walter Clinton, Welland, Ont. 22-11

For Sale

450 kv.a. Hydro Electric Equipment.
One new C.G.E. 450 kv.a., 400 r.p.m., 6,600-volt water wheel type generator.
One exciter for above.
One new double runner S. Morgan Smith unit, 37 feet head for direct connection to above.
Switchboard complete.

This equipment will be sold in whole or part. The hydraulic equipment is at York, Pa., and the electrical equipment is at Peterboro, Canada.

The Nova Scotia Power Commission,
5-8 Halifax, N. S.

For Sale

Sash, door and planing mill machinery, boilers, engines, motors, pulleys, gears, machine shop & moulding machinery, 8 ft. Linderman glue jointer. Full printed list on request to Cargill Limited, Cargill, Ontario. 5-8

For Sale

DIRECT CURRENT MOTORS, 110 volts and 220 volts, from 2 H.P. to 10 H.P. Many with variable speed rheostats; also pulleys, hangers, fans, etc. Write for list. Lawson & Jones, Limited, London, Ontario. 8-9

New Canal Connecting Milan and Venice Opened

The new canal connecting Milan and Venice was opened on February 2nd according to advices received from Milan. This marks the completion of a project undertaken several years ago and on which several million lire have been spent. This gives Milan, and a large section of country, a water outlet to the port of Venice. The port syndicate is reported to have purchased 11,000,000 square meters of land along the canal and propose the buying of 10,000,000 more to be disposed of to industrial concerns.

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

Electrical Superintendent desires position; would consider a municipal hydro and waterworks connection, or an industrial plant electrical position; good references and can get results. Box 544, Electrical News, Toronto. 7-10

WANTED—Meter Men—Who are willing to fill responsible positions. Our course in meter engineering prepares you. Demand exceeds supply. Employment service free. Write for "Special Offer" today. Fort Wayne Correspondence School, Dept. A., Fort Wayne, Indiana. 8

WANTED—By the Truro Electric Light Commission, an electrical engineer to take the position of manager of municipal light and power steam plant equipped with turbine generators. Send references and credentials and resume to W. K. Murray, Mayor and Chairman, Truro, N. S. 8-9

Wanted

Hydro-electric power house operators for high voltage power house operation. Must be familiar with operation of Lombard governors and Terrill regulators. Give details regarding experience, age, salary and references. Box 546, Electrical News, Toronto. 7-9

Wanted

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The bay at Santa Marta, Colombia, by reason of its depth of water, easy and safe accessibility for all kinds of water craft, and existing dock facilities for handling incoming and outgoing cargo has been undertaken by the Santa Marta Railway Co. (Ltd.), a British corporation, which, under the terms of its concession from the Colombian Government, not only operates 7 kilometers (1 kilometer=0.62 mile) of railway line, with about the same amount of branch trackage, but also is authorized to provide dock facilities and its own transportation system.

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710	Waggon
" 1	75	3	25	550	480	Waggon
" 1	60	3	25	550	750	C. G. E.
New 2	52	3	25	550	720	Lanc.
New 2	50	3	25	550	720	Waggon
New 2	35	3	25	550	720	Waggon
Used 1	30	3	25	550	1500	Tor & Hn.
" 2	30	3	25	550	750	C. G. E.
Used 1	25	3	25	550	750	C. G. E.
Used 1	25	3	60	220	720	C. G. E.
New 1	25	3	25	550	715	Lanc.
New 1	15	3	25	550	1450	Waggon
" 1	15	3	25	550	750	Lincoln
" 6	15	3	25	550	720	Waggon
New 2	13	3	25	550	700	Lanc.
" 2	10	3	25	550	720	Waggon
Used 1	7.5	3	25	220	1500	Tor & Hn.
" 1	7.5	3	25	550	1450	C. G. E.
New 1	7.5	3	25	550	720	Waggon
Used 1	6	3	25	550	700	Lanc.
Used 1	6	3	25	550	1440	Lanc.
New 1	5	3	25	550	1440	Lanc.
Used 1	5	3	25	550	1400	C. G. E.
Used 1	5	3	60	220	1120	Waggon
Used 1	5	3	25	550	710	Waggon
New 1	3	3	25	550	1500	Lanc.
New 1	3	3	25	550	1400	Waggon
Used 1	2	1	60	110	1750	Waggon
New 2	2	3	25	550	1430	Lanc.
" 3	1.5	3	25	550	1425	Lanc.
" 1	1.5	1	25	110	1720	Waggon
Used 1	1	1	25	110	1440	Tor & Hn.
" 1	1	3	25	550	1425	Lanc.

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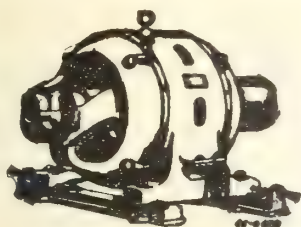
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1—100 H.P. 600 RPM.
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1—50 H.P. 900 RPM. Slip Ring
1—50 H.P. 900 RPM.
3—50 H.P. 1200 RPM.
2—40 H.P. 1200 RPM.
4—35 H.P. 1200 RPM.
4—35 H.P. 900 RPM.
1—35 H.P. 600 RPM.
3—30 H.P. 1200 RPM.
2—30 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—25 H.P. 1200 RPM.
1—20 H.P. 900 RPM.
2—15 H.P. 900 RPM.
1—15 H.P. 1200 RPM.
1—10 H.P. 1800 RPM.
2—10 H.P. 220 RPM.
1—7½ H.P. 900 RPM.
2—7½ H.P. 900 RPM.
1—8 H.P. 810 RPM. Crane
7—7½ H.P. 1200 RPM.
2—7½ H.P. 1800 RPM.
2—5 H.P. 900 RPM.

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11—5 H.P. 1800 RPM.
1—4 H.P. 1140 RPM. Crane
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15—2 H.P. 1800 RPM.
14—2 H.P. 1200 RPM.

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2—40 H.P. 900 RPM.
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1—25 H.P. 900 RPM.
1—20 H.P. 1200 RPM.
1—15 H.P. 1150 RPM. Slip Ring
1—12½ H.P. 1800 RPM.
2—10 H.P. 1800 RPM.
2—7½ H.P. 1750 RPM.
3—7½ H.P. 1200 RPM.
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21—1/2 H.P. 1800 RPM.
13—1/3 H.P. 1800 RPM.
12—1/4 H.P. 1800 RPM.
22—1/6 H.P. 1800 RPM.
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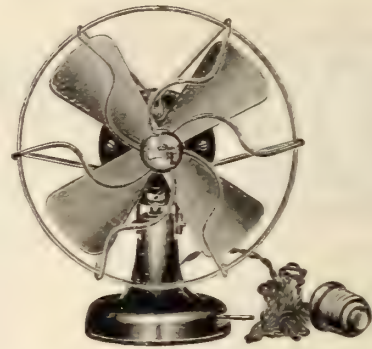
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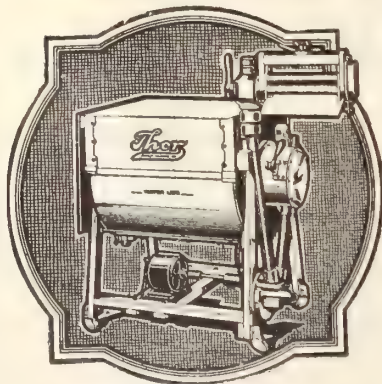
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- "The New Competition," by Arthur Jerome Eddy. 6th revised edition, price \$1.60.
- The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.
- The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 80c.



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For all classes of service.

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The absolute dependability of Kuhlman Transformers is due to our system of insulation.

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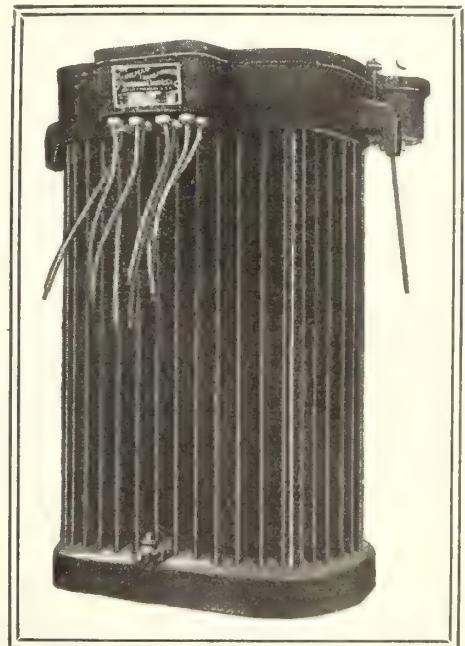
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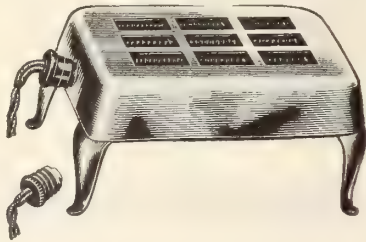
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HEATER and COOKER



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$\frac{1}{2}$ to 60 H.P.

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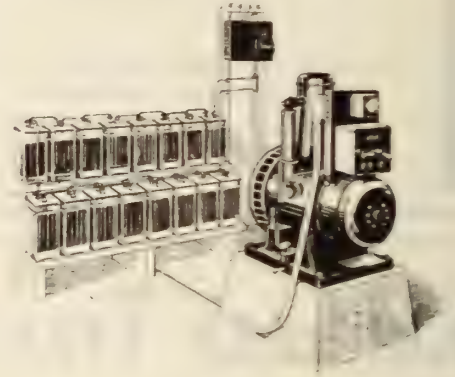
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The engine is the primary source of power of any lighting plant. It must be reliable. The engine of a Dominion Lighting Plant is as carefully constructed as that of a fine motor car. It operates at 1,000 revolutions per minute with an absence of vibration that means long life. 3 S.K.F. ball bearings, splash lubrication, detachable cylinder head and the efficiency of Kerosene for fuel are examples of the proper design characteristic of the Dominion. All Dominion Light units are built with the quality idea first and the competitive price last. That is why the Dominion is the plant for you to sell.

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By using our
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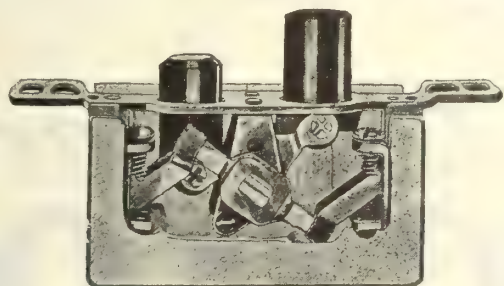
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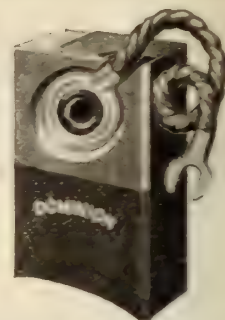


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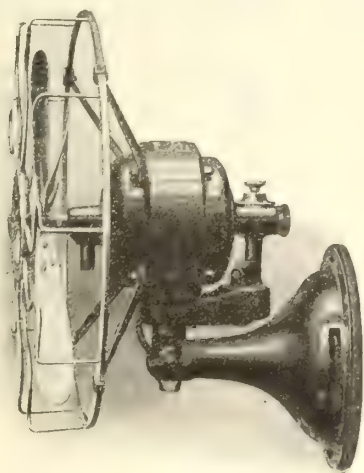
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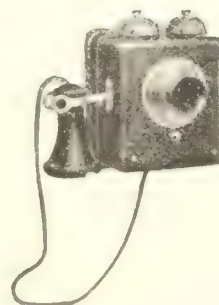
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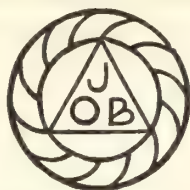
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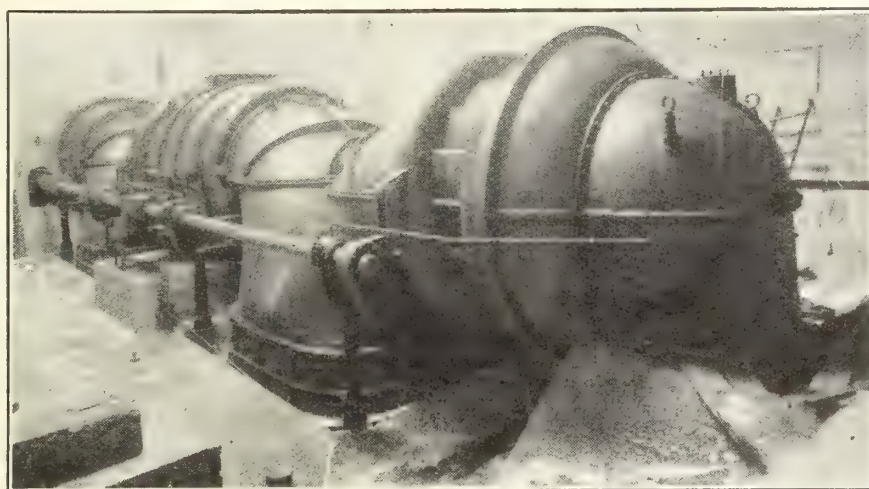
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Electric Motor & Machinery Co., Ltd.
MacGovern & Company
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Canadian Atlas Chemical Company

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Canadian General Electric Company
Diamond State Fibre Co. of Canada, Ltd.
Marchand Electrical Works
Northern Electric Company
Paulding, John I.

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Canadian Westinghouse Company

REFLECTORS

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Pittsburgh Reflector & Illuminating Co.

REMOTE CONTROL SWITCHES

Electrical Maintenance & Repairs Company

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A big argument in favor of any commodity is its ability to last a long time.

NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

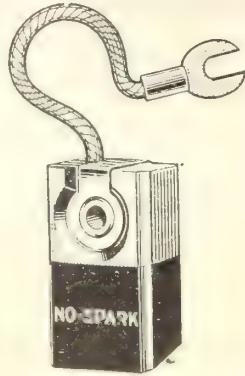
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

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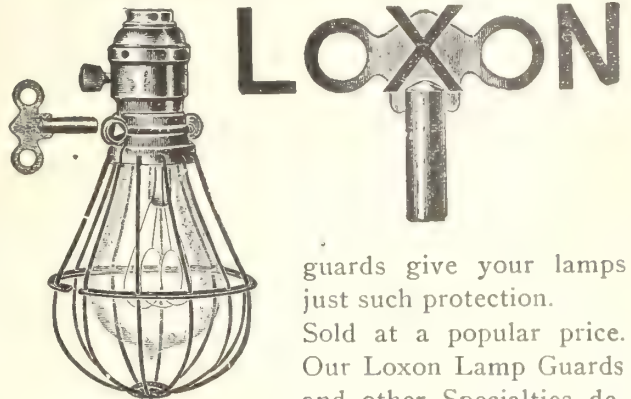
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Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



LAMPS Locked On Can't Get Stolen

They can't get knocked out or broken.



guards give your lamps just such protection.

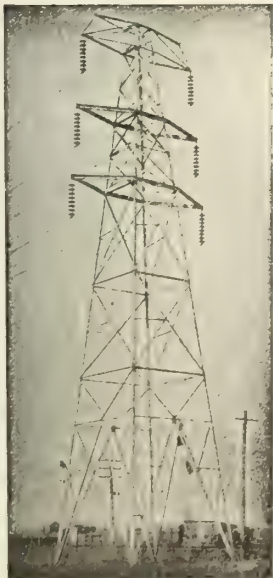
Sold at a popular price. Our Loxon Lamp Guards and other Specialties demand the attention of

every handler of Electrical Goods.

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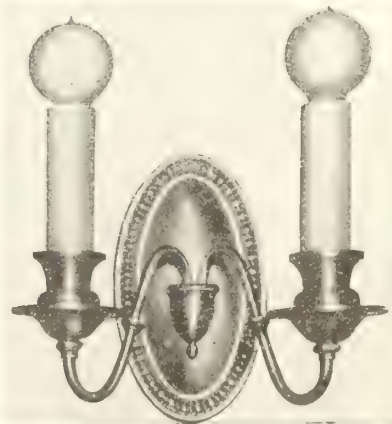
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We shall be pleased to furnish designs and estimates upon request.

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The Canadian Bridge Co., Limited
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Structural Steel of all Kinds
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No. 2640

LIGHTING FIXTURES OF ELEGANT SIMPLICITY

Tallman Brass & Metal Limited
HAMILTON, ONT.

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Renfrew Electric Company

STORAGE BATTERIES

Canadian General Electric Company
Canadian Hart Accumulator Company
Canadian National Carbon Company
Minimax Electric & Mfg. Co.
Northern Electric Company

STREET LIGHTING FIXTURES

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Devoe Electric Switch Company
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Hatheway & Knott, Inc.
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Boving Company of Canada
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Hamilton Company, Wm.
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Smith Company, S. Morgan

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In the Big Electrical Shops

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Coils, Wires, Armatures, etc., are thoroughly protected against moisture, oil, acids, alkalis, internal stresses, vibration, etc., by

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The Montreal Armature Works state: "We consider your Insulating Varnishes the best we have ever used in our motor and similar work, which includes 15 years' experience on all classes of work from the biggest to the smallest."

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The World's Best Known Construction Tools

Over three-fourths of the telephone and telegraph lines in America have been built with Oshkosh Tools.

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CONSTRUCTION TOOLS

—for over 40 years the choice of big buyers and good workmen. Produced from the finest wood, iron and steel, in a plant complete with modern equipment, each tool must be so good that it will pass a series of three rigid inspections.

No wonder more Oshkosh Construction Tools are sold than all other makes combined!

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"PITTSBURGH"

The
Scientific
Show Window
Reflector



Illustration shows "Pittsburgh" Reflector No. 100, for 100 or 150 Watt Lamp. Dimensions: Height 8 inches, width 8½ inches, holder 2¼ in. Form "0."

It reflects and controls the light to give the greatest possible illumination to the object. The "Pittsburgh" Reflectors, by scientific construction and test

give the maximum result from your lighting, and will pay for their small cost in saving of current. Don't fail to write for our folder on lighting efficiency.

Pittsburgh Reflector and Illuminating Co.

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MONTREAL, - CANADA

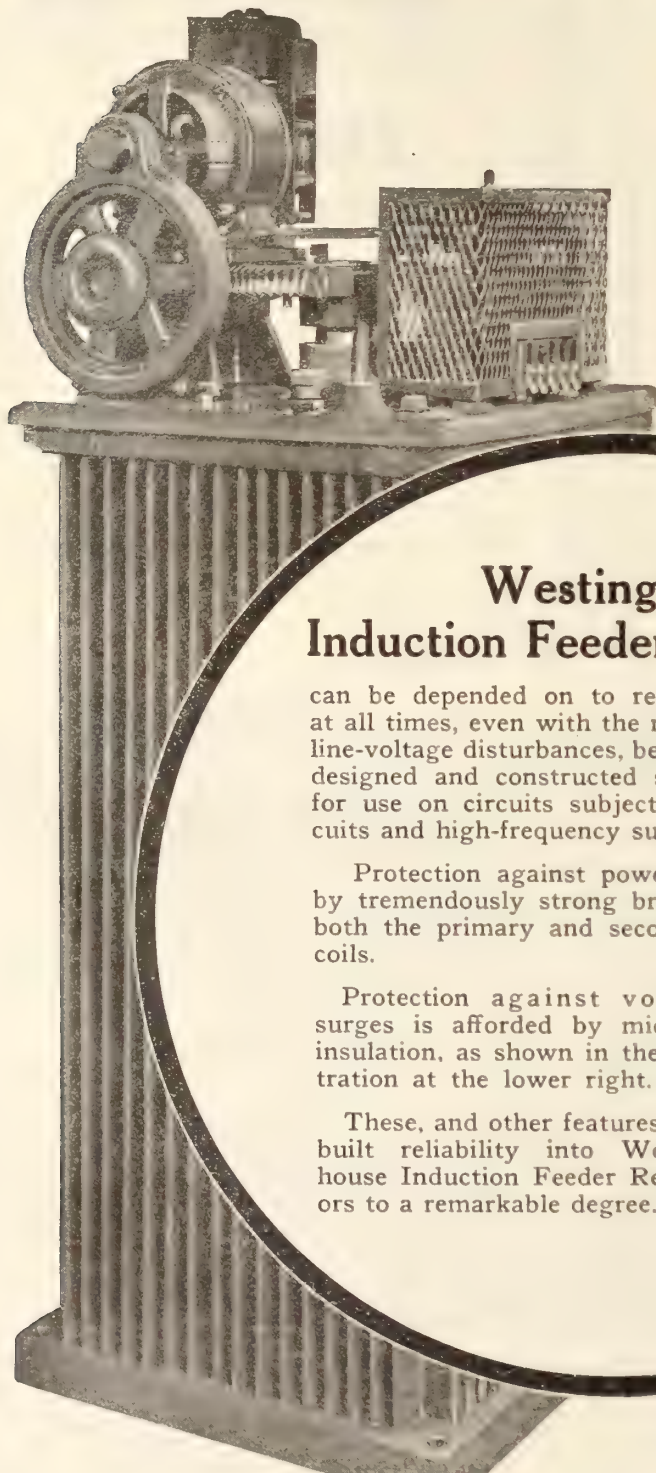
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Westinghouse

Safety and Service



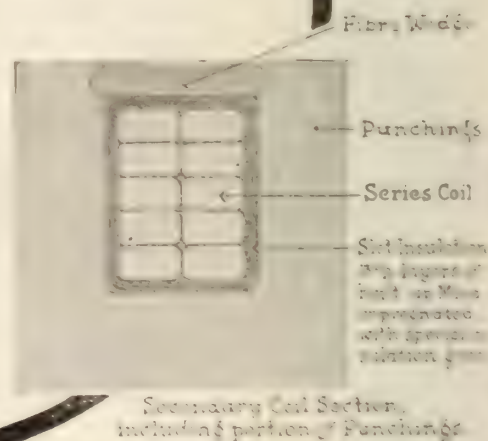
Westinghouse Induction Feeder Regulators

can be depended on to render reliable service at all times, even with the most severe power or line-voltage disturbances, because they have been designed and constructed so as to be suitable for use on circuits subject to heavy short circuits and high-frequency surges.

Protection against power surges is afforded by tremendously strong bracing of the ends of both the primary and secondary coils.

Protection against voltage surges is afforded by mica-slot insulation, as shown in the illustration at the lower right.

These, and other features, have built reliability into Westinghouse Induction Feeder Regulators to a remarkable degree.



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HALIFAX, 105 Hollis St.
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MONTREAL, 285 Beaver Hall Hill
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

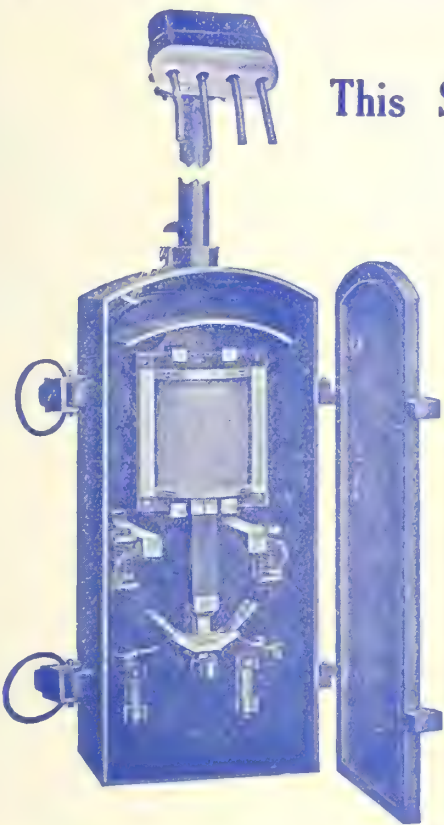
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WINNIPEG, 158 Postage Ave. E.
EDMONTON, 211 Mainland Bldg.

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MONTREAL—10 St. Sophie Lane
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This **SOLENOID SWITCH** has been adopted
by the Hydro Electric Commission

They use it for

STREET LIGHTING

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

Write for complete descriptive particulars

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Made in Canada
Conduit

Electrical Wiring
Made Safe

Approved by the Hydro-Electric Commission of Ontario
Labelled under supervision of Underwriters' Laboratories

XCELADUCT
(GALVANIZED)

For All
Electrical
Installations

Manufactured by
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LIMITED

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*Manufacturers of High and Low
Tension Porcelain Insulators*

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The National Electric Heating Company takes pleasure in offering the celebrated Air-Way Electric Cleaner to the trade in Canada.

The Air-Way is good for your business, because it is crammed full of exceptionally convincing selling points: The hollow suction handle makes it light enough to be easily picked up and applied to hangings, mouldings, high ledges, etc.; no stooping is necessary to attach the various useful appliances supplied with the Air-Way: the universal joint that makes the handle as flexible as the human wrist; the sanitary paper dust bag that can be burned or thrown away; the transparent dust indicator and many other features close sales for you.



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Ask for literature that will make clear to you the exceptionally interesting points of superiority in this excellent machine.

National Electric Heating Company, Limited

544-548 Queen Street East, Toronto, Canada

112 Crescent St.,
Montreal, P.Q.

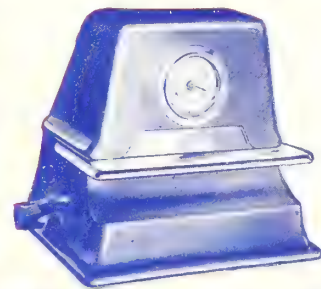
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Electrical

News

Engineering Contracting Merchandising Transportation



YOUR TIME CHARGE

Where Minutes are Turned Into Dollars

YOU can check with relative ease the materials you use in any product.

Time—which is more costly and more precious than the materials—is elusive and cannot be checked accurately or quickly by a manual system.

For this reason an adequate cost-keeping system can be based only on complete, reliable, mechanically-produced records of labor costs.

INTERNATIONAL JOB TIME RECORDERS

give you an accounting of the time spent by every employee on every job—an accurate record of all **Productive** and **Non-productive** Time. They are employed in all lines of industry. Supplying data which cannot be obtained accurately or economically in any other way.

International Business Machines Co. Ltd.

Frank E. Mutton, Vice-President and General Manager

Head Office and Factory

300-350 Campbell Ave., Toronto, Ont.

For your convenience we have Service and Sales Offices in Vancouver, Calgary, Winnipeg, Walkerville, London, Hamilton, Toronto, Ottawa, Montreal, Quebec, St. John, N.B., Halifax, St. Johns, Nfld.

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Northern Electric Line-Construction Material

*Everything you need
for pole-line
work—*

Poles
Crossarms
Brackets
Pins
Braces
Bolts
Lag Screws
Pole Steps
Guy Clamps
Cable Rings
Anchors
Insulators
Strand
Wires
Tools

¶ Building new lines and maintenance of existing lines are two important operations involving the investment of money.

¶ Invest that money wisely by standardizing on Northern Electric line-construction material.

¶ A thorough knowledge of engineering and service conditions governing line-construction—a knowledge gained from years of study and experience—enables us to offer materials that are used wherever high standards of service are a prime requisite.

¶ Our branch houses maintain adequate stocks—they can provide you with everything for the work on hand.

Northern Electric Company
LIMITED

Montreal Halifax Quebec Toronto Winnipeg Calgary Vancouver
Ottawa Hamilton London Windsor Regina Edmonton



Crossarms in One of Our Yards.



Condulets



Conduit Fittings



Wiring Devices



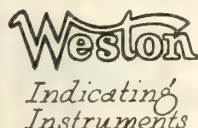
Square D Safety Switches



Flashlights



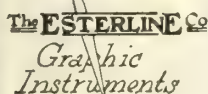
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Indicating Instruments



Protective Switching Apparatus



Graphic Instruments



Electric Signal Apparatus



THE KEY TO SAFETY

Trade-marks Representing Quality Products

IT GIVES us genuine satisfaction to be associated with the companies represented by these well-known trade-marks.

Each trade-mark stands for a quality product of the highest grade that has long since established its worth wherever electrical work is done.



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Wiremold & Fittings



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Control Apparatus



Wiring Devices



SUPERIOR WIRING DEVICES

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HALIFAX	TORONTO	WINNIPEG	EDMONTON
QUEBEC	HAMILTON	REGINA	VANCOUVER



Wiring Devices



Shawmut Fuses



*A most attractive
Wedding
Present*

Northern Electric **Portable Lamps**

Delightful to the June Bride as an artistic and practical gift. Moderately priced, they sell most readily to that vast majority who must practice economy without sacrificing good taste.

Light comes from two bulbs and is evenly distributed by a shade of amber- or green-ribbed glass, giving a silk effect when the light is on. The portable is perfectly balanced and finished in Italian bronze with black or green relief.

June is the month for weddings.

*Our nearest house can make
prompt shipments from stock.*

Northern Electric Company LIMITED

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Halifax	Ottawa	Hamilton	Windsor	Winnipeg	Vancouver

Why "Noark" Fuse protection is dependable insurance

The best made fuse— "Noark"

THE reliability of a "Noark" Fuse is never a doubtful matter. Throughout the entire process of its manufacture every precaution is taken to insure reliability and in addition these precautions are backed up by many actual tests of every fuse before it leaves the factory.

The name, "Noark," on a fuse is too valuable to risk on anything but the best. So, when overload or short circuit occurs, you know a "Noark" Fuse will open the circuit promptly, quietly and safely.

"Noark" Renewable and Non-Renewable Cartridge Enclosed Fuses, in all standard capacities, are approved by Underwriters' Laboratories, Inc., under the Label Service.

Canadian Johns-Manville Co., Ltd.

Toronto Montreal Winnipeg Vancouver
Hamilton Ottawa Windsor



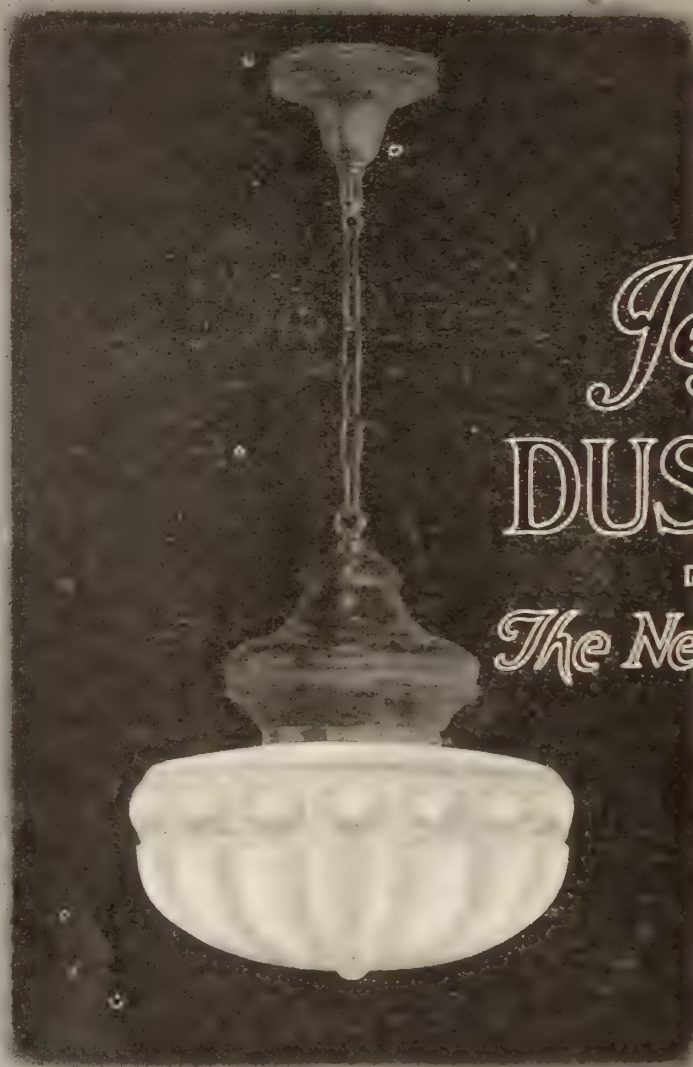
*Buy Johns-Manville Electrical Materials from
the ample stock of any one of these distributors*

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<i>Montana</i> Montana Electric Co., Butte Montana Electric Co., Great Falls	<i>B. C., Canada</i> Horsman, E. B. & Sons, Vancouver
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"Noark" Fuses and all other Johns-Manville packaged Electrical Materials are distributed strictly through distributor-dealer channels on a basis that gives full protection to all concerned. Dealers can get all details from their Distributor. Distributors, for samples and complete information, should apply to the Electrical Department of the nearest Johns-Manville Branch.

JOHNS-MANVILLE ELECTRICAL MATERIALS



Jefferson
DUSTPROOF

MADE IN CANADA

The New One Piece Unit

WE SELL THE GLASSWARE ONLY

No. 396

This is the new sanitary semi-direct lighting unit which is a production from popular demand. The design of the unit has been made pleasing as well as efficient for lighting.

Electrical Dealers will find that

THERE IS A BIG DEMAND FOR DUSTPROOF
and that new business can be obtained by displaying this new unit.

The Jefferson Glass Company, Limited

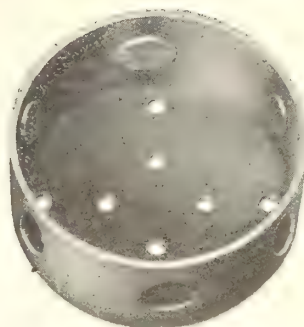
Head Office and Factory: 388 Carlaw Avenue
Toronto

Showrooms: 164 Bay St., Toronto
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285 Beaver Hall Hill, Montreal
510 Hastings St. W., Vancouver

—after June 1st, 1921—!

By a ruling of the Hydro Electric Power Commission of Ontario, and effective June 1st, 1921, all concealed knob and tube work must terminate in approved loom outlet boxes.



Catalogue No. 1010



Lighting Fixtures
Portable Lamps
Switch Plates
Switch Boxes
Conduit Boxes
Solderless Connectors
Electrical Devices

The Banfield Loom Outlet Box has six easily removable knock-outs; is made of pressed steel in black japanned finish; has four screw holes to take No. 10 wood screws; and four clearance holes to accommodate the Banfield No. 1036 $\frac{3}{8}$ " malleable iron "fixture stud, or one of any other standard make. It is $3\frac{1}{4}$ " in diameter and $1\frac{1}{2}$ " deep.

Packed in standard cartons of one hundred. Sold by jobbers throughout Canada.

Write us direct for sample and prices.

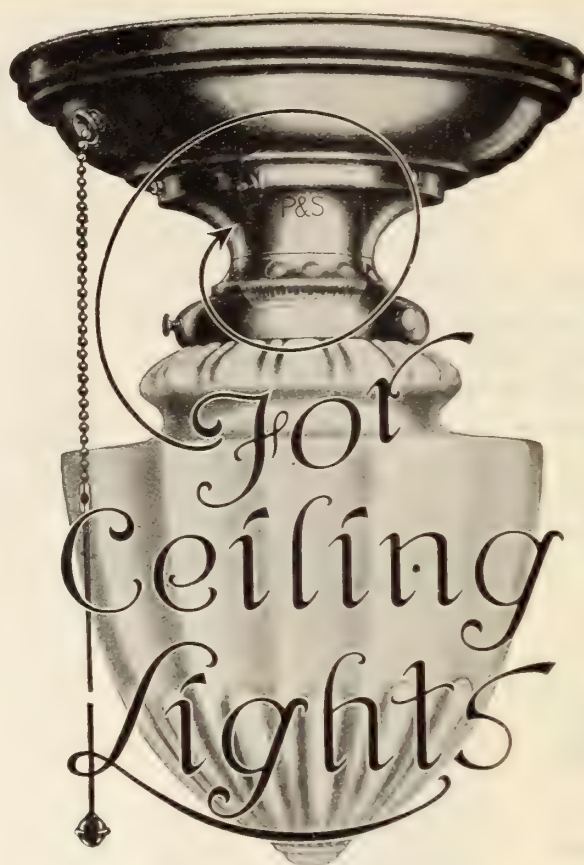
Specify BANFIELD LOOM OUTLET BOXES

W. H. Banfield & Sons, Limited

Manufacturers of Lighting Fixtures, Portable Lamps and Electrical Devices

370-386 Pape Avenue, Toronto

*The Arrow
Points at the
Receptacle*



*Send for a
Sample of
P&S 998
Now*

Let us send you a free Sample
because these Receptacles are selling at this time

Fixture Men and Electrical Contractors
are Buying P&S 998 and 427



P&S 998

Easy to buy
Quick to use
For Quick Sales

Make a Snappy Bed-room Light
with 998 or 427

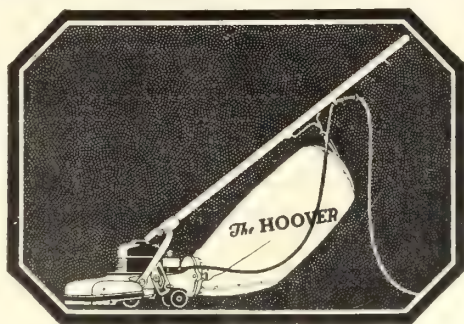


P&S 427

Only a few folders left—

Write today for Ceiling Light Folder

PASS & SEYMOUR, Inc.
SOLVAY NEW YORK



Concentrate on The Hoover for these Solid Reasons!

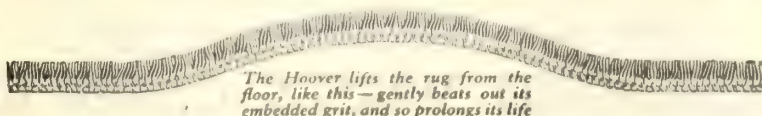
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2. The company behind The Hoover is a veteran establishment—the largest in the industry.
3. Unquestionably The Hoover is the only *thorough* cleaner, because only The Hoover beats.... as it sweeps as it cleans by air.
4. The makers of The Hoover stand back of it in every way, including their guarantee that The Hoover greatly prolongs the life of rugs.
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6. Users of The Hoover invariably are satisfied users, people who recommend it to friends rather than complain about it.
7. The Hoover is produced in four models, a model to meet every price demand and to fulfill properly every need.
8. The *new* Hoover air-cleaning attachments similarly meet, with efficiency and convenience, all the requirements of cleaning curtains, portieres, upholstery, etc.
9. The Hoover field organization, fully experienced in the retail sale of electric cleaners, is at the elbow of every Hoover dealer.
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11. The Hoovers sold in Canada are *completely manufactured*, not merely assembled, in Canada. They are 100% Canadian.

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and General Offices: Hamilton, Ontario

The HOOVER

It Beats... as it Sweeps as it Cleans

For operation on farm lighting or private electric plants The Hoover is equipped with special low voltage motors at no extra cost



The Hoover lifts the rug from the floor, like this—gently beats out its embedded grit, and so prolongs its life

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

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Rubber Covered Wires and Cables

FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

GALVADUCT and LORICATED

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.



"LORICATED"

• A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

"A Galvaduct Building"
United Typewriter Building, Toronto

CONDUITS COMPANY

LIMITED

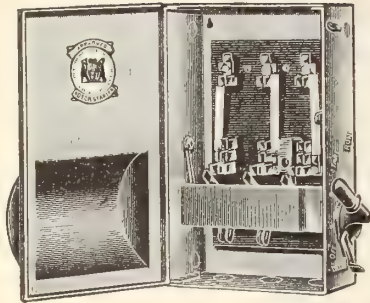
Toronto

Western Sales Office:

Montreal

602 Avenue Building, Winnipeg

Electrical Engineers! This Will Interest You



The Original, Single Throw Canadian Made Motor Starter

The Single Throw Movement going from start to run is done without breaking the contact and in each case the Blades make positive contact, thus eliminating all Arcing and Burning of Blades.

An outside Trip puts the Switch in Off position, with the finest Quick Break possible.

The Box is of one piece with a welded cover, having the same gauge of Metal throughout and is built to last also is of the Shallow Type.

Another instance of convenience for the Electrician is that this Unit is complete with all Knockouts necessary for Installation under any condition.

There is only one main spring, made of Swedish Steel Wire, in the construction of this Motor Starter, eliminating trouble to the minimum.

Another feature of this Modern Device is the small space it requires for installing.

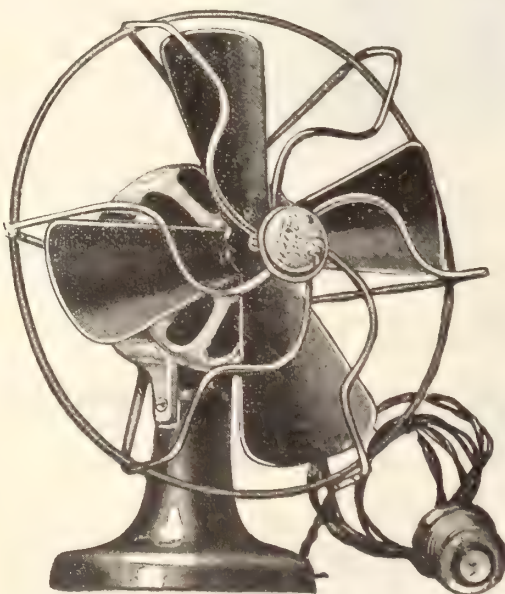
The Switch is designed to meet the last word in Motor Starters and manufactured in Canada by the Benjamin Electric Mfg. Co. of Canada, Limited.

Canadian Drill and Electric Box Company, Limited

1402 Queen Street East

TORONTO, Ont.

Fan your sales into a flame with **The Polar Cub** ELECTRIC FAN



Made in 6" size - \$10.50 retail

Made in 9" size - \$16.50 retail

This summer is going to duplicate the dog days of 1919—The same kind of mild winter produced a hot summer. The demand for Polar Cub Fans was enormous and we could only supply about forty per cent. of the demand.

Do not be caught napping this year—Send for our 1921 proposition right now.

THE

**A. C. Gilbert-Menzies Company
LIMITED**

439 King Street West

TORONTO

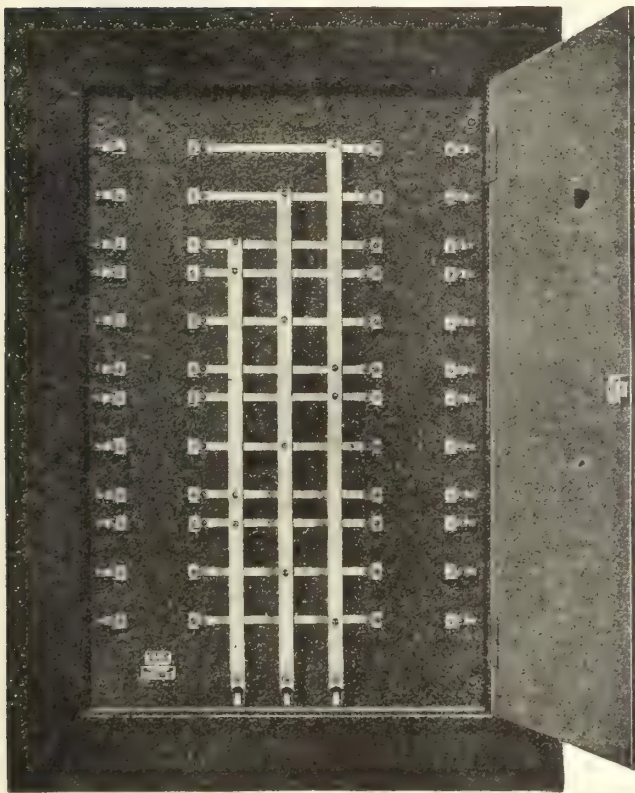
*Manufacturers of Gilbert Toys, Agents for Gilbert's
Fans, Motors, Vibrators, Sewing Machine
Motors, Etc.*

Manufacturers Gilbert's Erector and Gilbert Scientific Toys, Amateur Wireless Sets, etc.

MADE IN



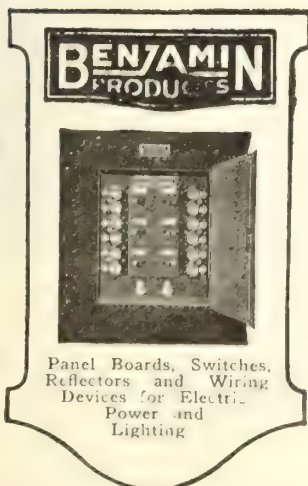
CANADA



BENJAMIN PANEL BOARDS

are constructed on the principle that it is better to take precautions than to run the risk of accidents. Mineral veins or flaws which are common to slate or marble are absent from composition material used for bases, which is also impervious to moisture and superior electrically and mechanically.

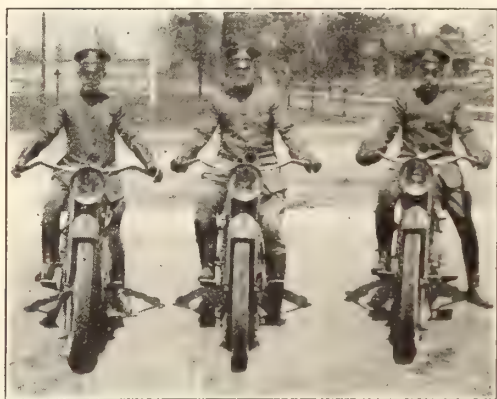
Send us your specifications to
11-17 Charlotte St., Toronto.



**BENJAMIN ELECTRIC MFG. CO. OF CANADA LIMITED
TORONTO**

212 MCGILL STREET
MONTREAL

311 CONFEDERATION LIFE BLDG.
WINNIPEG



There's One for Every Purpose

The range of the Exide's usefulness is as broad as the application of electric energy. Whether it be to shoulder the responsibility of the central station standby; the central energy systems of modern telephony; or to furnish lighting and ignition for the motor-cycle; there is an Exide for the purpose.

Engineers are invited to confer with our Engineering Department at any time on their storage battery problems.

Exide Batteries of Canada, Limited

153 Dufferin Street, Toronto

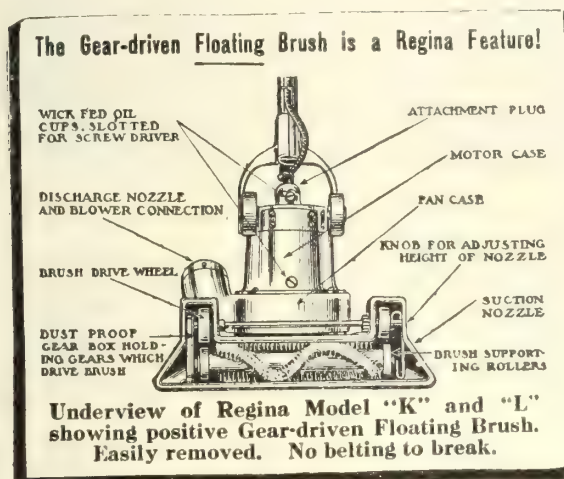
Exide Batteries are made in Canada, in England, and in the United States. Into the Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

Exide

MADE IN CANADA
BATTERIES

Regina Vacuum Cleaner

The gear driven floating brush is an exclusive Regina feature. The powerful suction takes up all threads and lint, and thoroughly cleans your rugs of all imbedded dirt. A sure business getter. DEALERS enquire about our attractive sale proposition.



FRANKE, LEVASSEUR & CO., LIMITED

150 CRAIG STREET WEST

Sole Canadian Distributors

MONTREAL



Guard Precious Lives

Open switch panel boards with their live contacts exposed are dangerous in the extreme. Every year they take their toll in precious lives. In apartment houses, schools, office buildings and factories, Safety Panel Boards should be installed. These panels commend themselves for their handsome appearance, simplicity, efficiency and safety. No live parts exposed—it is impossible to receive a shock.

Write for Catalogue 12 A

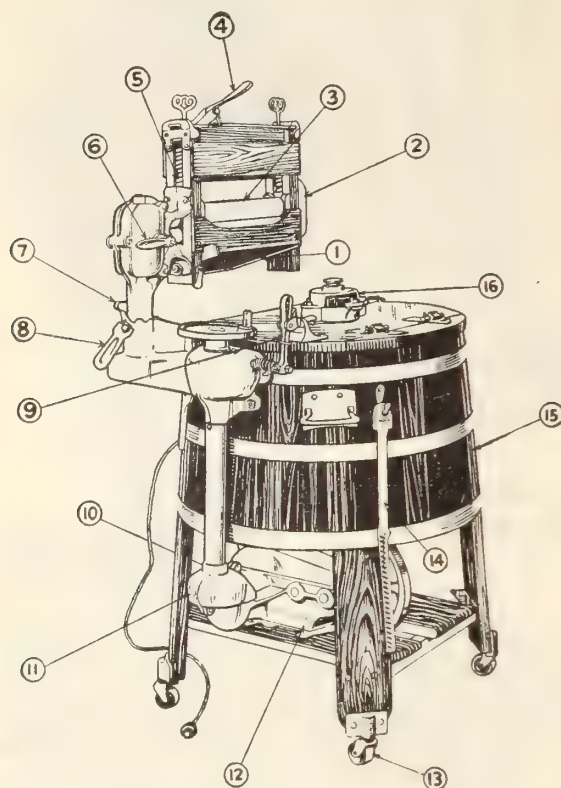
The Canadian Krantz Electric & Manufacturing Co.

HEAD OFFICE — 95 King St. East, Toronto

401 New Birks Bldg., Montreal

402 Vancouver Block, Vancouver

703 Confederation Life Bldg., Winnipeg



- 1—Reversible drain board.
- 2—Wringer gear covered.
- 3—12" highest quality rubber rolls.
- 4—Safety device to separate rolls.
- 5—Heavy wringer frame.
- 6—Operating lever for wringer to start, stop, or reverse rolls.
- 7—Safety catch prevents wringer swinging unless desired.
- 8—Swinging wringer tightener.
- 9—Lever to operate washing machine.

- 10—Belt tightener.
- 11—Gear covered.
- 12—Machine-cut gearing run in hard oil.
- 13—Large tread swivel casters.
- 14—Rack bar on hook when cover open.
- 15—Extra heavy selected quality cypress tub.
- 16—Slusher post to be raised before lifting cover—open four-winged slusher used on this machine, of most effective design.

The Sixteen Points

Shipments made from nearest point: Ottawa, Ont., London, Ont., Winnipeg, Man. Address us at Ottawa.

For British Columbia, address McPherson & Teetzel Co., Vancouver, B.C.

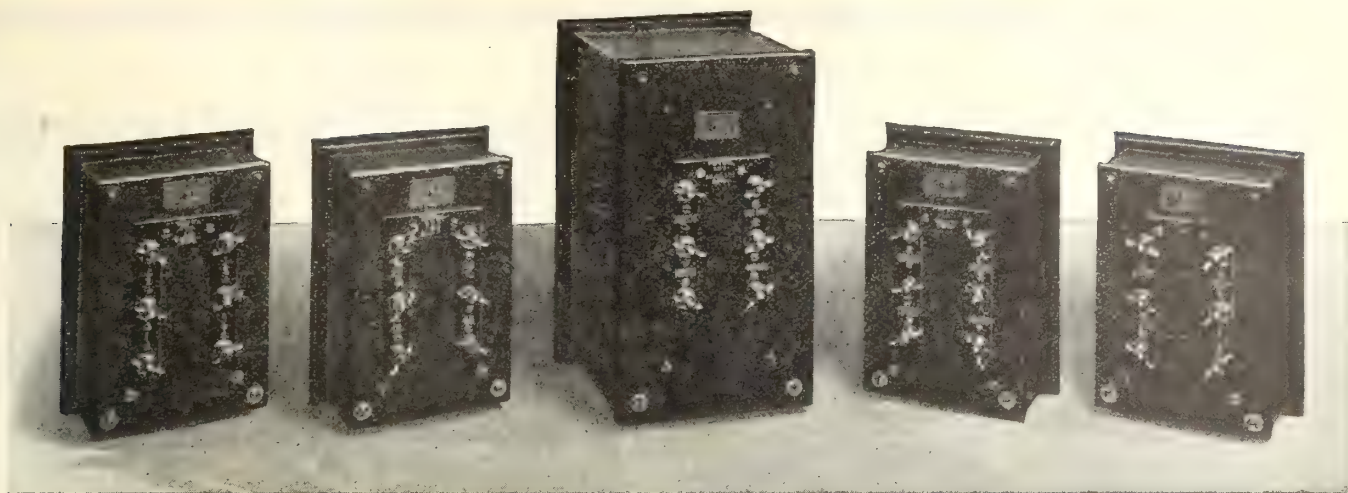
A MACHINE may be right as to general design and principle of operation, yet if the many so-called "details" are not of the highest efficiency, constant trouble will be the lot of the user.

Those responsible for the CONNOR Perfection Washer had this in mind from the first, as a glance at the above diagram will show. Thus it is that the busy housewife—for whom the CONNOR was really built—sees the weekly wash done smoothly and efficiently, free from the many little troubles too often attendant upon the use of washing machines.

There is not one of these "sixteen points" of superiority that the dealer cannot use as sales argument. And every one strikes home because they are logical and easily understood by the prospective customer—which accounts for the wonderful success with which the CONNOR is everywhere meeting.

Perhaps you would like us to go into full details with you? If so, get in touch with us direct.

J. H. CONNOR & SON LIMITED, Ottawa, Ontario

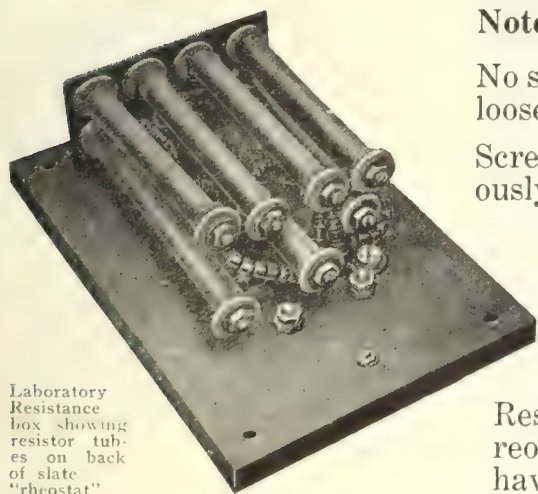


1 to 1,000,000 Ohms

in steps of 1 ohm can be obtained with a set of

Vitrohm Resistance Boxes

for Laboratory and College Use



Laboratory
Resistance
box showing
resistor tubes
on back
of slate
"rheostat"
front

Note these unique features:

No short circuiting plugs to wear loose or get lost.

Screw "plug" can be instantaneously turned to "on" or "off" but cannot be removed.

Screw "plug" provides much larger contact area and insures perfect contact.



Resistor Units are standard "Vitrohm" construction—vitreous enamel insulation—fireproof; non-absorbent—they have greater capacity than the ordinary bridge units, and are more rugged.

These units have very low temperature coefficient of resistance. They are accurate to within $\frac{1}{2}$ of 1% of their rated resistance.

The case in which units are is substantially made, highly finished and furnished with pedestal base. Ask for details and quotations.

Ward Leonard Electric Company

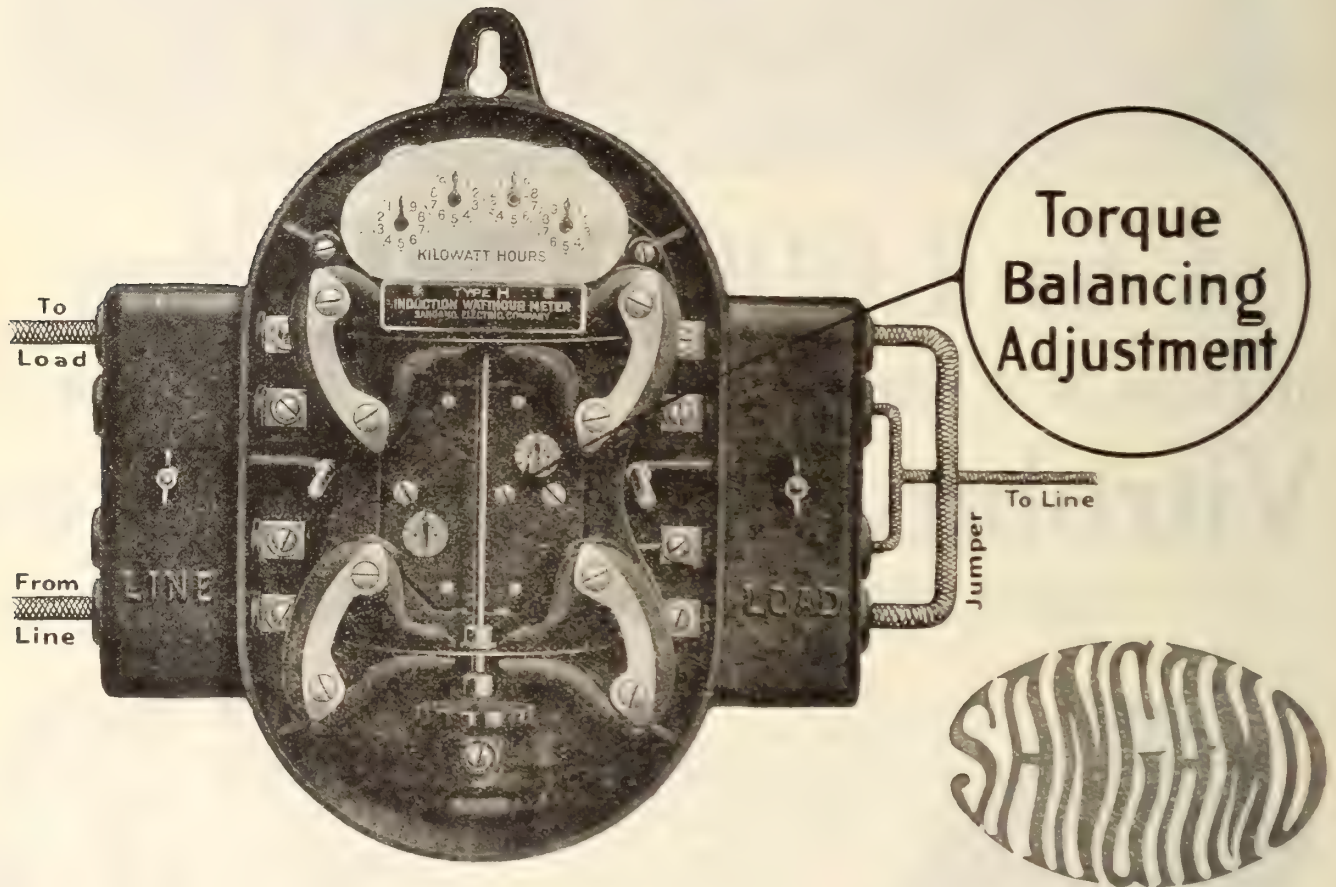
LOCATED 150 FEET NORTH OF NEW YORK CITY, IN

MOUNT VERNON

NEW YORK

207.

Sangamo Torque Balance of Polyphase Meter



Sangamo design permits an instant balance of the two elements for torque in Polyphase meters. It is only necessary to buck the elements with a "Jumper" as shown. Loosen two clamp screws of the plate and turn the torque balancing adjustment screw until disc movement ceases. This adjustment varies inversely the magnetic air gaps of the two elements

until correct balance is obtained. This important adjustment, so troublesome in many types, is extremely simple and positive with Sangamo Polyphase meters.

Our nearest agent can give you many other reasons why type "H" Polyphase meters should be on your lines. Ask for Bulletin No. 5518.

Sangamo Electric Company of Canada, Limited

Factory: TORONTO

Head Sales Office: MONTREAL

Packard

TRANSFORMERS

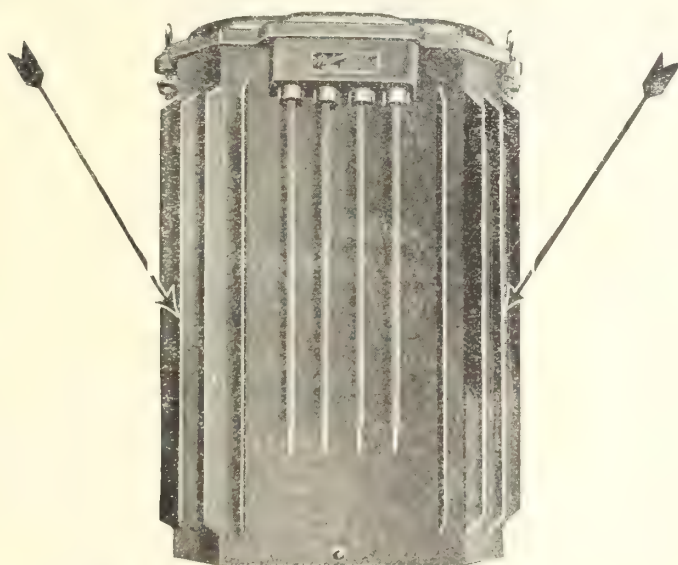
LOOK! Something New!!

Heat Dissipators

ON OUR

Welded Steel Cases

ADVANTAGES—Smaller Transformer, Less Weight,
Lower Temperature Rise, Greater Overload Capacity



Others may follow, but we lead.

The Packard Electric Co., Limited
St. Catharines, Ontario

401 Temple Building, Toronto

725 Power Building, Montreal

Confederation Life Building, Winnipeg

Agents:

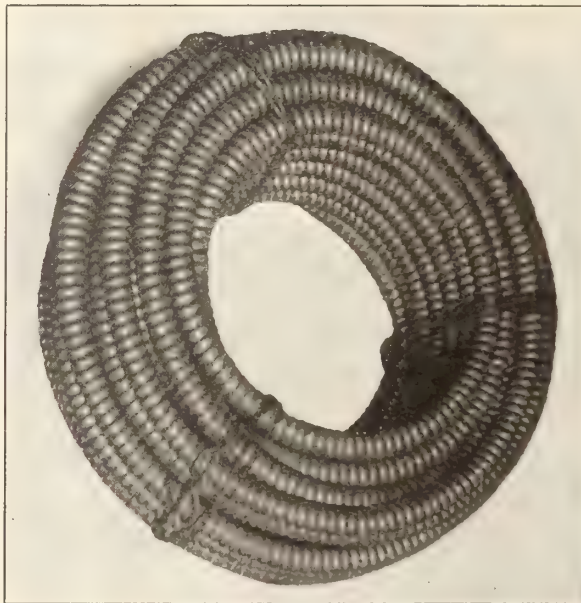
Eastern Electric Co., Limited, St. John, N.B.

J. T. Warren, 738-11th St. West, Calgary, Alta.

W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.

"TRISTEEL"

Made in Canada



View of Coil of $\frac{1}{2}$ " "Tristeel" Flexible Conduit. Inspected and labeled under supervision of Underwriters' Laboratories.

"Tristeel" is made in all sizes from $\frac{5}{16}$ " up to and including $1\frac{1}{2}$ ". The internal diameter of all sizes of "Tristeel" is slightly larger than trade size, for your convenience and benefit.

"Tristeel" Flexible Steel Conduit with a 5 h.p., 3 phase, 550 volt motor, with oil switch installation.



"Tristeel" Flexible Steel Conduit is particularly adaptable to this class of installation, due to the fact that the finished conduit can be bent around projection on a close angle as small as a 2° radius.



"Tristeel" Flexible Steel Conduit with 5 h.p. motor, with safety enclosed switch.

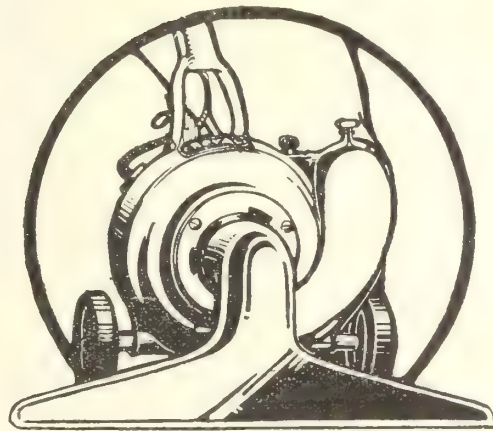
Selling Agents:

CONDUITS COMPANY LIMITED

33 Labatt Avenue, Toronto

Keep Your Eye on the Bull's-Eye of Business

Of all sweet words,
Whether English or Czech,
The sweetest are these—
"Enclosed find check."



SATISFACTORY merchandise is paid for promptly—and the prompt collection of money due is the aim of every man in business. For success is measured not in what is due you, but in what you've got. Electrical merchants who handle the

ROYAL
QUALITY SERVICE

ELECTRIC CLEANER
Cleans by Air-Alone!

have the minimum trouble in getting the money. People pay promptly because the ROYAL lives up to your promise. It gives complete and abiding satisfaction.

So people who buy ROYALS boost ROYALS. Each customer brings another—until you have an endless chain of unsolicited prospects coming to your store.

These satisfied customers do not stop at buying ROYAL Cleaners. They buy other merchandise—and your whole business prospers.

There is nothing mysterious about the ROYAL'S success. That success rests upon the machine's ability to do practical cleaning. Women like it because it is light, graceful and handy, because it does its work thoroughly, quickly, easily, and because it does all kinds of cleaning.

You will be interested in our "Confidential Merchandising Plans"—especially if your cleaner sales have petered out during the winter slump. With the ROYAL Cleaner and the ROYAL merchandising plan, sales and profits are sure. We have proof; write for it.

Great West Electric Company Limited
WINNIPEG - MANITOBA

Eureka Dealers Study Their Sales Records—and Smile

EUREKA dealers all make money—make it month after month because the demand for Eurekas never changes. Here are two reasons for Eureka's continuous popularity:

Eureka is extensively advertised in the leading women's magazines.

Eureka is a grand prize cleaner at a reasonable price. It sells for \$5 to \$15 less than other cleaners because of its superior design and because the Eureka factory capacity is 1,000 machines a day.

Our comprehensive sales co-operation and generous discounts make a Eureka representation permanently profitable.

We have some open territory waiting for aggressive, able dealers—electrical contractors and dealers, hardware and department stores, etc. One of our representatives is stationed near you. He will call if you write or wire us.

EUREKA VACUUM CLEANER COMPANY, KITCHENER, ONT.



EUREKA

Draws the
Air Clear Through


CIRCUIT BREAKERS
**BETTER AND CHEAPER THAN FUSIBLE CUTTERS
THE CUTTER CO. PHILADELPHIA.**

It Can Be Done

QUALITY LOW PRICES
100% SERVICE

The Ideal Combination

If this appeals to you let us
quote on your electrical
requirements and

WE WILL PROVE IT.

Cassco General Supplies

REGISTERED

MONTREAL

Phone M. 302

315 Craig St. West

DIAMOND FIBRE

**and its place
in the Electrical Field**

In the electrical industries Diamond Fibre has been pre-eminently successful, not only because of its superior insulating qualities but also because of the ease with which it can be machined and formed into the many intricate shapes required.

For **Track Insulation**, requiring the above qualities as well as resistance to pressure, vibration and weather conditions, Diamond Fibre has proved itself the most satisfactory material and with a lower initial cost.

In the manufacture also of **Bushings, Cleats**, and the hundreds of other articles used in the Electrical Field its high dielectric strength (an electrical resistance of 200 to 400 volts per mil of thickness) makes it particularly suitable.

We are now making a Fibre specially adapted for slot wedges in the manufacture and rewinding of motors.

There is no limit, in fact, to the commercial uses of Diamond Fibre.



Let us tell you more about Diamond Fibre. Write for our new illustrated catalogue which will give you the fullest information as to the uses to which Diamond Fibre can be put and show you how it will fit into your special problem.

**Diamond State Fibre Company
of Canada, Limited**

Head Office and Works:

**235 CARLAW AVE., TORONTO, CANADA
MONTREAL BRANCH—84 St. Francois Xavier St.**

We Built Six

We take some pride in the fact that a group of six single phase Transformers as supplied by us to the American Cyanamid Company represent the largest Transformers of this type ever built in Canada. See illustration.

These Transformers, like many others for special duties, were designed and built complete in our Plant here in St. Catharines.

At your service.



1000 K.V.A., 11,000 VOLTS TO 100,000 VOLTS, 15 H.P. & 25 H.P., single phase, water-cooled, Canadian Crocker-Wheeler Transformer.

Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

**THE CANADIAN
CROCKER-WHEELER CO.
LIMITED**

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL

Wirelets



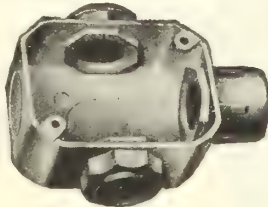
Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1420
1/4" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment
"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

FERRANTI METERS

Ferranti Meters are made to give a permanent service in constant accuracy.

Their actual record in the electrical field proves that they unfailingly serve the purpose for which they were made. They are specified where only the utmost in efficient accuracy is tolerated.



WATT METER

Ferranti Meter & Transformer Mfg. Co. Ltd.

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128 Bleury St.
MONTREAL.

Simpson Bldg
HALIFAX.

145 Market Ave.
WINNIPEG

Northwestern Engin-
eering & Supply Co.
CALGARY

Northern Ontario
J. P. Bartleman
Timmins

Attractive Profits Selling This Machine

The average householder can effect a saving of between \$50.00 to \$100.00 a year by the use of

The CANADIAN IRONER

The profits you can make selling this machine are unusually attractive and we would like the opportunity of explaining our agency proposition to you.

The "CANADIAN" is furnished in three sizes, 46 in., 42, and 37 actual ironing widths. Motors are supplied standard 110 volts and 220 volts direct current, and 60 cycles, 100 or 220 volts alternating current.

Manufactured in Canada by

Meyer Bros.

99-101 Queen Street E., Toronto
423 St. James Street, Montreal

ESTABLISHED 1884



*Used
From*

*Universally
Approved*

Moloney
*A purely
Canadian made
Product.*

Transformers
*All inquiries
receive prompt
attention.*



*Coast
to
Coast*

*Reliable
and
Efficient*

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg

District Offices

Factory

Head Sales Office

Montreal and Halifax

Windsor, Ont.

1221-2 Bank of Hamilton Bldg. Toronto

G. M. Gest, Limited

Contracting Conduit Engineers

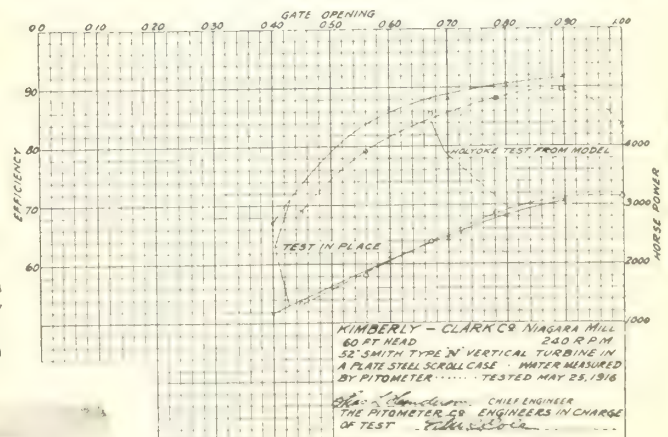
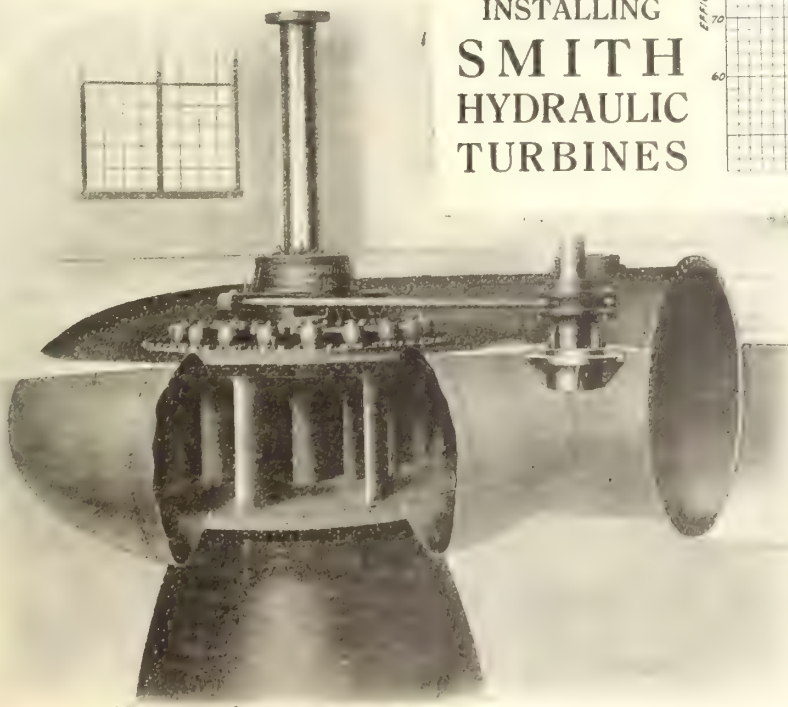
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Power Building
Montreal

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JUSTIFY
INSTALLING
SMITH
HYDRAULIC
TURBINES



The year 1921 has on its program an immense amount of

**WATER POWER
DEVELOPMENT.**

If interested, ask for Bulletin "N"

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York, Pa., U. S. A.

H. B. VAN EVERY, Representative
405 Power Building - MONTREAL

Let Miss Simplicity Do It



Our motto is "Efficient Service." We give a liberal guarantee, prompt shipment of orders and supply you with free advertising matter to assist you in making sales.

YOU want a real leader—one that will sell quickly and easily and bring quick turnover, good profits. You want to increase business, to make new and profitable customers.

Then let Miss Simplicity do it.

There is a proved market everywhere for an electric clothes washer like Miss Simplicity. It is priced quite low and yet embodies all the right qualities. It is just what the average housewife will buy because she can afford it.

You can take pride and pleasure in saying to your customers, "Let Miss Simplicity do it."

Miss Simplicity makes easy sales because of its handsome appearance and moderate price and then makes other sales because of its perfect operation and sure customer satisfaction. Everything about Miss Simplicity will commend itself heartily to you. Made of the very best materials, assembled with every care, thoroughly inspected and tested and with our absolute guarantee behind it.

What more could you want? Write to-day for some further particulars and our dealer offer.

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Hespeler, Ontario

Quebec Distributors:

Northern Electric Company
Limited

MONTREAL, P.Q.



Western Distributors:

Great West Electric Company
Limited

WINNIPEG, MAN.



Light Weight

W EIGHT is a very important consideration when selecting a fan for home use where it is carried from room to room.

The drawn steel frame and base of the R & M Fan weighs less than one-half as much as that of the ordinary cast iron fan. The 12-inch oscillator weighs only 18 pounds and the 9-inch weighs but 9 pounds. A child can

carry one of these fans with ease.

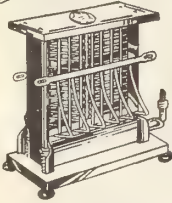
This light weight feature is one which appeals very strongly to the woman purchaser, and it is the woman who is the important factor in the purchase of fans for home use. Dealers find the light weight of the R & M Fan a very effective help in the sale of fans.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans

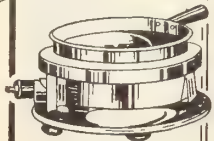
Renfrew
Electric
Products
Limited
Renfrew, Ont.

Canadian Beauty



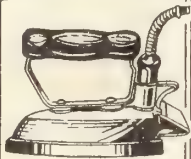
Toaster

Canadian Beauty



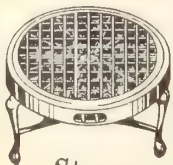
Three-heat
Grill

Canadian Beauty



Iron

Canadian Beauty



Stove

Canadian Beauty



Majestic
Heater

Canadian Beauty



Percolator

Canadian Beauty

Woman Remembers Long After Others Forget

WOMAN hates more than anything else to be "done" on a purchase.

If she buys something that doesn't come up to her expectations or doesn't prove its money's worth she'll vow to "get even."

She will steer all of her friends away from the store in which she bought the article. She'll even drum up trade for his competitor.

On the other hand, if she's **pleased** with a purchase she will come back to that store for more and she'll bring her friends to buy.

And what is it that pleases her?

Quality. The super kind of quality the woman sees, feels and finds in the New Canadian Beauty Electrical Appliance Line.

Stock the New Canadian Beauty Line and you'll appreciate the importance of **Quality**.

We operate on a discount plan, which does not entail carrying large stocks. That means quick turnover—good profits.

Stock up, go after business hard, link up with our big, national, advertising campaign and—watch your profit column bulge!

Order through your jobber or, if you prefer, direct from us.

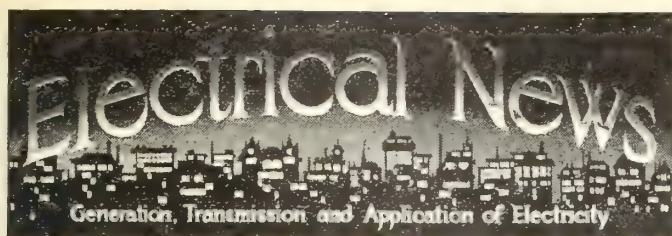
RENFREW ELECTRIC PRODUCTS CO., LIMITED
Head Office and Works: Renfrew, Ont.

29 Richmond St. West, TORONTO, ONT.

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The New

Canadian Beauty Electrical Appliances



For nearly thirty years the recognized journal for the Electrical Interests of Canada.

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Toronto, May 1, 1921

No. 9

Ontario Chapter of Illuminating Engineering Society

A number of enthusiastic illuminating engineers met in the Hydro Club Rooms, Murray St., Toronto, on Monday, April 25, and formed an Ontario Chapter of the Illuminating Engineering Society. Mr. W. P. Dobson, Director of the Strachan Avenue Laboratories of the Hydro-electric Power Commission of Ontario, was in the chair. Business consisted of the adoption of a Constitution and the election of officers for the coming year.

The constitution provides for three classes of members:

- (a) Members.
- (b) Associate members.
- (c) Affiliates.

Classes A and B have respectively the same qualifications as members and associate members of the parent society, that is, a member or associate member of the Toronto Chapter is automatically a member, or associate member, of the Illuminating Engineering Society. The term "affiliate," however, does not imply any connection whatever with the parent society. Affiliates only pay a local fee which does not include the privilege of the publications sent out from time to time by the Illuminating Engineering Society.

Control of the Chapter is vested in an executive committee of five members, to be known as president, secretary-treasurer, and a committee of three. Three of the five must be either members or associate members.

The officers elected for the coming year were as follows:

president, Geo. G. Cousins, Strachan Avenue Laboratories, Hydro-electric Power Commission of Ontario; secretary-treasurer, W. H. Woods, Toronto Hydro; executive committee, G. R. Anderson, associate professor of physics, Faculty of Applied Science and Engineering, University of Toronto; M. B. Hastings, A. H. Winter-Joyner, Ltd.; and Frank T. Groome, Ho'ophane Company.

It was pointed out by the chairman that the objects in view in the formation of this Chapter were that the value of good and correct lighting may be better understood and more widely advertised. Good lighting in the homes means that these homes are more attractive and more restful; in the office and factory it means more production, better quality, greater safety and higher efficiency all around; on the street it means reduction of accidents and crime.

It is the intention of the Chapter to hold popular lectures that the general public may be placed in touch with the facts regarding better illumination and gain a clearer vision of the possibilities obtainable by the expenditure of a minimum amount of money if it is accompanied by proper engineering skill.

Canadian Electrical Association Just Closing Active Year

With the approach of the summer the fiscal year of the C. E. A. is soon coming to an end and the general activities of the association are now concentrated in getting ready for the Annual Convention, which is to be held in Quebec City on the 15th, 16th and 17th June next at the Chateau Frontenac. It is hoped to make it a banner convention.

An elaborate programme is being prepared which will consist of the reports of the various committees of the association for the past year, most of which have been actively at work for several months, and also several papers are to be presented by prominent men in the industry on topics of interest to the members.

It is also intended to show films of the General Electric Company accompanied by lectures as well as certain safety films which can be of interest to those attending. Although nothing has yet been finally decided, it is possible that a lighting exhibit may be secured for the occasion.

Besides strictly business matters, it is intended to have entertainments in line with past conventions. To this end the city of Quebec lends itself with particular charms due to its beautiful and historic location and surroundings. Indeed, there is every reason to believe that the coming convention will prove a very interesting one from every standpoint. The details of the programme will be announced later.

Among the main activities of the association during the past year could be mentioned the formation of the St. Maurice Valley Section of the C. E. A., the officers of which are as follows: Chairman, C. R. Reid; vice-chairmen, G. M. Anderson, J. S. Whyte, J. I. Morgan; treasurer, B. G. Wood; secretary, W. C. Stewart. This section has been formed for the benefit of the members located at Grand Mere, Shawinigan Falls, Three Rivers and ultimately La Tuque. Five meetings have already been held at which very interesting papers have been presented. This new section has now a membership of approximately seventy-five and the success has been complete enough to suggest the formation of similar sections at other centres in Canada where a sufficient number of members are grouped together.

Another matter of general interest to the electrical fraternity in Canada, as mentioned in these columns previously, is the medal offered by the association to anyone throughout the Dominion who resuscitates any other person from electrical shock by the Prone Pressure Method of Resuscitation. The medal, besides being an insignia of which anyone could be proud, will also have an historical bearing insofar as the

metal of which it is to be cast will have been used for a feat of some kind in the development of the electrical industry. For instance, the first lot of medals will be struck by using copper which was in service on the first high-tension transmission line in the British Empire some thirty years ago. When that first lot is exhausted some other metal of equally significant meaning will be used, and so on.

The purpose of this medal is to stimulate a greater interest in the thorough practice and drilling of the Prone Pressure Method of Resuscitation from electrical shock, which, besides its humanitarian aspect, will also tend to diminish the number of unfortunate casualties which in most of the cases ought not to happen at all. The exact conditions under which the medal is to be given will be announced shortly.

Now the question is—who will be the first one to win the medal?

Interesting Review of Wireless Telephone Progress

A talk on wireless telephony was given by Mr. Douglas R. P. Coats, of the Marconi Wireless Telegraph Company of Canada, Limited, at the Montreal Electrical Co-operative Luncheon on April 13th. The talk was mainly of a popular character, with demonstrations of the latest developments in wireless telephony by means of a small outfit. Thus music played at the company's laboratory in Montreal was received and rendered audible by amplifiers.

Mr. Coats explained that development of wireless telephone science was steadily progressing and that its ultimate possibilities were still a matter of conjecture. He also exhibited and explained the "coherer" and the vacuum valve, obsolete and present types of receiving devices.

The coherer consisted of nickel and silver filings in vacuum and between two silver plugs. The filings would not allow the passage through them of small battery currents, but were susceptible to the influence of Hertzian waves, and while under such influence permitted battery currents to pass with comparative ease. Many difficulties were, however, encountered in its operation, one of them being that the filings would not decohere after the passage of a signal. Marconi solved this and a good many other problems, and the coherer remained in commercial use for some little time after the introduction of the Magnetic Detector. This detector comprised an endless band of iron wire rotated by clock-work through a magnetic field. Received currents affected the magnetic field and the moving iron, producing signals in a telephone receiver. The magnetic detector was superseded by the crystal receiver, and this in turn by the vacuum valve. This valve has three elements in vacuum: a straight filament which is made incandescent; a spiral of wire called the "grid," wound about but not touching the filament; and a cylindrical "plate" surrounding but not touching the grid. The incandescent filament emits electrons which pass across the vacuum space of the plate. The spiral grid provides an easy means of controlling the flow of electrons, and by ingenious circuit arrangements, the valve may be made to act not merely as a rectifier of received currents, that is as a detector, but as a booster of such currents, (increasing received signals enormously) and also as the producer of powerful oscillating currents and continuous waves for radiotelephone transmission to great distances. Mr. Coats told of the wonderful developments in radiotelephony which had followed the introduction of the valve for transmitting purposes, and terminated his address by describing the reception, by Canadian amateurs, of church services and vaudeville entertainments transmitted by wireless telephone over long distances.

Development of Western Electric Company Subject of Address

"The Development of the Engineering Department of the Western Electric Company," was the subject of an address by Mr. J. L. McQuarrie, assistant chief engineer of the company, at a meeting of the Northern Electric Engineering Society, Montreal, on April 18th. Mr. McQuarrie, who has been connected with the engineering department of the Western Electric Company for more than 25 years, gave a description of the apparatus and switchboards which his company have developed from the inception of the company until the present time.

The Western Electric, he said, was the first independent telephone manufacturing company in existence. It was not in any way connected with the Bell Telephone Company when it started, but was a manufacturer of telegraph instruments for the Western Union Telegraph Company. As time went on orders were placed with the Western Electric for various telephone parts.

The first switchboards brought out were made up in small sections large enough for one operator; the lines were magneto, and when additional lines were required another section was added. Short trunk lines connected them together to complete the circuit, which may have originated on the lines of one section and terminated on the lines of another section. In course of time numerous sections had to be placed in an exchange, but the drawback to these short trunk lines between the sections was the very slow service which it involved. The manager of one of the Pacific Coast operating companies installed an automatic drop signal between operators by which the service was speeded up, and engineers from all parts of the Eastern section inspected the signal with a view to seeing whether it could be applied to their own systems. Opinions were divided as to this signal—one group thought that automatic signals should be applied to the magneto switch boards which were then in use, but the Western Electric group fitted automatic signals to a new type of switchboard which they called the multiple section, in which all the lines terminated in front of every three operators. This was about 1895, and about the same time the lamp signal came into prominence, to replace the drop signal, and was adopted by the Western Electric on their new multiple section. This proved to be the best arrangement and speeded up the service to a very high degree. Engineers from all over the United States came to the conclusion that the common battery multiple section fitted with lamp signals was superior to the magneto system, and ultimately it was adopted in every large centre of population.

Automatic telephones had been the subject of experiment and invention practically since the telephone was invented.

Push Advertising to Revive Trade

Roger Babson says:—

"During the last year or so many concerns have been swamped with business. In most cases they were over-sold. At that time we advocated setting aside an advertising reserve fund instead of plunging into business publicity that was not needed. The turn has come. The present problem is how to get enough orders to keep the plant operating. This is the situation for which the advertising reserve fund was provided. Clients are advised to draw upon these last reserves to develop business and to help avoid closing down or radically curtailing production. Push your sales and advertising departments."

but the ideas were so crude and so impractical that the Western Electric did not take up the subject for many years. Ultimately an undertaker named Strowger thought out a plan whereby he could eliminate the central office operator, and he invented a system using five wires to each telephone. From that time the automatic telephone became a reality. Invention after invention followed; thousands of automatic telephones have been installed; wonderful improvements have been made; and for many exchanges the automatic telephone is considered as the only future system.

Panel type automatic central office equipment was invented in order to handle the situation in large centres of population such as New York and Chicago, but manufacturing was so expensive that unless enormous numbers were required per annum the equipment could not be economically produced.

Vacuum tubes had been used recently more and more for long distances telephones and telegraph work as repeaters which enabled the conversation to extend beyond 500 miles. Mr. McQuarrie then referred to the use for the first time of a continuously loaded single conductor submarine cable (designed by the Western Electric Company and made in England) laid in water 6,000 feet deep between Cuba and Florida for telephone purposes, this forming part of a long distance circuit from Havana, Cuba, to Los Angeles, Cal., and by wireless to the Catalina Island off the California coast, which was used with great success on April 11th last.

Mr. McQuarrie also alluded to the many inventions of Mr. C. E. Scribner, who joined the staff in 1877 as an engineer. That staff has been increased so that to-day about 3,000 engineers are employed by the company.

Electrical Men Hear Kind Words from Gas Competitor

Mr. Arthur Hewitt, general manager of the Consumers Gas Company, addressed The Electric Club of Toronto at their regular meeting on Friday, April 15. Mr. Hewitt is a delightful speaker as well as an enthusiast on the universal utility of gas. A happy feature of his address was his entirely friendly attitude towards the electrical industry. He does not consider electricity an objectionable competitor and, indeed, was frankly grateful that the electrical industry had relieved his company years ago of certain unprofitable business, to wit, street lighting. Mr. Hewitt humorously defined the difference between a municipally-owned plant and a privately-owned plant, namely, that the municipally-owned plant is controlled in New York, because that is where the municipal securities are generally sold, whereas the privately-owned gas plant is owned by the citizens of Toronto, because they hold the Consumers Gas Company's securities.

Dwelling at some length on the technical problems of the company, the speaker explained that the manufacture of gas and the utilization of all the by-products represented the most economical use that is made of coal by any industry.

The Consumers Gas Company, of Toronto, is generally looked upon as a most ideal compromise between advocates of municipal ownership and advocates of strictly private ownership. The Consumers Gas Company has a franchise which limits its dividends, requiring any surplus profit to be used for the purpose of reducing the rates to the public. The city also has representation on the gas company's board and, finally, the securities of the company are very widely held by the citizens, having been sold from time to time in small blocks, which encouraged local investors.

Application is to be made to the Federal Parliament for the incorporation of La Cie de Telephone Quebec Union Electrique, with authority to construct, maintain and operate telephone lines east of the province of Ontario, in the provinces of Quebec, New Brunswick and Nova Scotia.

Municipal Convention in Clifton Hotel June 23, 24, 25

The Association of Municipal Electrical Utilities will hold their Mid-summer Convention on June 23-24-25 (Thursday, Friday and Saturday). The convention will be held in the Clifton Hotel, Niagara Falls, Ont., as on former occasions.

The morning session of Thursday, April 9th, will be taken up with registration and other details. The afternoon session will be given over to a thorough discussion on commercial subjects, this matter being left in the hands of the members of the Commercial Section of the association; the subjects will include Advertising, Window Dressing, Sales Campaigns, Service in Merchandising, etc.

On Friday morning, April 10th, Mr. J. W. Purcell will read a paper on "Power Supply in Rural Communities. On Friday afternoon Mr. W. C. Cale will deliver a paper on "Safeguarding the Users of Electrical Appliances."

Special entertainment will be provided on Thursday and Friday evenings. On Saturday morning the members will make an inspection trip over the Chippawa development, which has been making such splendid progress during the past few months.

Annual Meeting Engineering Standards Association

A meeting of the Main Committee of the Canadian Engineering Standards Association was held at Ottawa on April 4th, Sir John Kennedy in the chair, and the following were some of the more important matters dealt with:

Sir John Kennedy was re-elected chairman; Mr. T. A. Russell and Mr. H. H. Vaughan were re-elected vice-chairmen, and Dr. J. B. Porter was re-elected honorary secretary-treasurer.

The following gentlemen were welcomed as members of the Main Committee: Mr. J. B. Reade, Purchasing Commission of Canada; Mr. G. A. Mountain, Board of Railway Commissioners for Canada; Lt.-Col. E. W. Stedman, the Air Board; Dr. L. V. King, McGill University; Mr. T. F. Sutherland, Canadian Institute of Mining and Metallurgy.

A large number of additions to the membership of various sectional and sub-committees were approved, and thirty gentlemen, members of various working committees, were elected to membership in the association.

The annual report and financial statement to be issued to members of the association were presented and approved.

The attendance of Mr. R. J. Durley, secretary, at the conference of secretaries of national standardizing bodies in London on April 25th was approved. This conference is of an informal nature and is intended to facilitate the interchange of information and data regarding standardization, especially in its international aspect, and with regard to planning the methods of intercourse and co-operation to be adopted between the various national standardizing bodies. It is expected that the meeting will be attended by delegates from Belgium, Great Britain, Canada, France, Holland, Italy, Sweden, Switzerland and the United States. Each secretary will naturally present a report on the work of the conference to his committee or council on his return.

The activities of the association during the past year and the present state of the work of the various committees are briefly covered by the attached report.

Among the subjects on which the association has recently been requested to take action may be mentioned the following:

A request from the Air Board has been made for the preparation of specifications for certain aircraft materials which cannot be obtained under commercial conditions in Canada, the war-time specifications of the British Air Board

being much too elaborate for use under peace conditions. The necessary committees are being arranged for.

Co-operation with the American Engineering Standards Committee has been requested in connection with the Aeronautical Safety Code, the American Safety Code for Logging and Sawmill Machinery, and the American Committee which is considering the standardization of parts of elevator machinery.

Requests for co-operation have also been received from the Canadian Electric Railway Association and the American Gear Manufacturers' Association.

In connection with the work of the Sub-committee on Portland Cement, which is engaged in revising and re-drafting the specification for that material originally issued by the Canadian Society of Civil Engineers, the Main Committee approved of the suggestion of the sub-committee as to the desirability of experimental work on Canadian cements with regard to the best method of determining normal consistency. The Main Committee also directed that arrangements should, if possible, be made with the proper authorities for the standardization of cement sieves in Canada.

The meeting terminated with a vote of thanks to the Executive Committee and the officers and staff of the association.

The meeting of the Main Committee was followed by the Third Ordinary General Meeting of the Association, which was largely of a formal nature and during which the Annual Report and Financial Statement were presented and approved.

Operation of Power and Lighting Sub-Station in Emergency

The effectiveness of automatic sub-stations for light and power service was shown recently, when some trouble occurred on the system of the St. Paul Gas Light Company. There was trouble on one of the trunk lines, which caused a momentary drop in voltage. The line was not cleared immediately and all of the synchronous apparatus at the manual station was put out of service. The Westinghouse automatic sub-station, of course, cleared itself from the line, but was restored automatically to service in a few seconds. It helped to take care of the direct-current network, which was immediately picked up automatically by a storage battery at the manual station. The voltage on the direct current system dropped from 240 to 180 volts. The contractors on the line panel of the automatic sub-station opened cutting in resistance. This station continued giving service, however, through this resistance until enough of the manual station equipment was brought back into operation to restore service to normal. The period of trouble lasted for about five minutes. The automatic sub-station installed on the system of the St. Paul Gas Light Company is the first automatic sub-station ever applied for use in light and power work. The sub-station was placed in operation some months ago, and the result has been entirely satisfactory.

Power Rights Extended Two Years

The Grand Falls Company's rights in the water powers at Grand Falls, on the St. John River, N.B., have been extended for two years, that is, to May 1, 1923, on condition that they shall have expended \$150,000 on actual construction work by that date. Mr. F. T. Dodge, of New York, president of the International Paper Co., which controls Grand Falls, promised they would do everything physically and financially possible to carry out the agreement. He stated that the initial development of 35,000 to 40,000 h.p. would cost in the neighborhood of \$6,000,000 which, with the construction of transmission lines and the necessary auxiliary equipment, would bring the total investment up to about \$10,000,000.

Power Development in the Montreal District

By R. M. WILSON

Chief Engineer, Montreal Light, Heat and Power Consolidated.

An address on the "Power Development of Montreal and the Surrounding Municipalities" was given by Mr. R. M. Wilson, chief engineer of the Montreal Light, Heat, and Power Consolidated, at a large gathering of the members of the Northern Electric Engineering Society on Monday evening, April 4th. This meeting was held in the large assembly hall of the Mechanics Institute Building on Atwater Avenue.

Mr. Wilson was introduced by Mr. W. S. Vipond, president of the society, who stated that the speaker of the evening had been with the company or its predecessors for 29 years and that he had seen great changes in power development during that time.

In the course of an historical outline of power development in the Montreal district, Mr. Wilson referred to the early development of open arc street lighting with current generated by constant current Brush dynamos having armatures wound like a ball with six segments in the commutator. This type of machine gave many years of good service.

Hydro-electric plants operated by different companies were installed at Chambly on the Richelieu River, about 17 miles east of Montreal, and at the Lachine Rapids, on the St. Lawrence River, about five miles southwest of Montreal. One of these plants generated 60 cycle alternating current and the other produced 66 cycle current. This is the reason of the present use in the Montreal district of 63 cycles, being a happy medium between the cycles formerly used and adopted as standard when both of the original hydro-electric plants were consolidated under one management. The motors in use on the original 60 cycle and on the 66 cycle systems were kept in service without change when the number of cycles as finally adopted was changed to 63 cycles per second.

All motors and transformers ordered for use in this district at the present time are specified as "60 cycle motors or transformers guaranteed by the manufacturers to work satisfactorily on 63 cycles."

The population of Montreal has increased rapidly during the past 30 years, being 220,000 in 1890 and 808,000 in 1920. The growth in power demand is at present following the general law of doubling every seven years. This does not seem to be affected by business depression, which also occurs every seven years; for example, in 1879, 1886, 1893, 1900, 1911, 1921.

In 1890 with a population of 220,000, only 775 kilowatts were supplied, while in 1920, with a population of 808,000 in this district, 240,000 kilowatts were furnished. The number of kilowatt hours in 1890 was 2,700,000, while in 1920 this amounted to 643,000,000.

Students of the amount of power consumed in various parts of the country and in the United States would not be surprised by the statement that Montreal leads all other cities on the American continent in the amount of power consumed per inhabitant per year. The following are the figures:

Philadelphia uses ..	250 kilowatt hours, per capita, per year
New York City ...	450 kilowatt hours, per capita, per year
Buffalo	585 kilowatt hours, per capita, per year
Toronto	700 kilowatt hours, per capita, per year
Montreal	750 kilowatt hours, per capita, per year

Mr. Wilson briefly described the Montreal Light and Power Consolidated.

erating stations of the Montreal Light, Heat and Power Consolidated by means of lantern slides, as follows:

The Chambly Plant

This is about 17 miles east of Montreal on the Chambly River. The available head of water is 23 feet. Eight 3,100 horse power turbines are each direct connected by horizontal shafts to eight 2,000 kilowatt, 2-phase, 63 cycle, 2,200 volt, generators. A bank of transformers steps up this voltage from 2,200 volts, 2-phase to 25,000 volts, 3-phase. This plant was installed in 1898.

The Lachine Rapids Plant

The available head of water for the plant is 14 feet. The plant is approximately 5 miles south-west of Montreal, on the north bank of the St. Lawrence River. Forty-eight vertical shaft turbines of 200 horse power each are geared in sets of six to eight horizontal shaft 750 kilowatt, 3-phase, 63 cycle, 4,400 volt generators. In addition four 1,500 horse power turbines are each direct connected by vertical shafts to four 1,000 kilowatt, 3 phase, 63 cycle, 12,000 volt generators. Transformers step up the 4,000 volts to 12,000 volts, so that all out-going lines have the latter voltage. This plant was also installed in 1898.

The Soulanges Plant

This is about 30 miles southwest of Montreal on the north bank of the St. Lawrence River. The water comes from the Soulanges Canal and the available head of water is 50 feet. Three 5,200 horse power, horizontal shaft, turbines are each direct connected to three 3,750 kilowatt, 3-phase, 63 cycle, 4,000 volt generators. Provision is made for a fourth set to be installed in the future. Transformers step up the 4,000 volts to 66,000 volts. The plant was installed in 1908.

The Cedars Rapids Plant

Situated near the Soulanges plant, the Cedars Rapids development takes its supply from the St. Lawrence River. The available head is 30 feet but will be 32 feet by the extension of a wall up-stream in the river. Twelve 10,800 horse power, vertical shaft turbines are direct connected to twelve 10,000 kilovolt-ampere, three phase, 63 cycle, 6,600 volt generators. Provision is made for six additional sets to be installed in the future, and two of these sets will be added at once. These machines run at the exceptionally low-speed of 63 revolutions per minute, and they have the distinction of being 37 feet diameter over all—the largest frames in use in Canada. The space between the blades of the water wheels is large enough for a man to walk through.

The transformer house is a four-storey reinforced concrete building 130 by 220 feet, in which the voltage is stepped up to 66,000 volts for Montreal and to 110,000 volts for Massena, N.Y., 48 miles away. The plant was installed in 1914.

Trouble originally developed in the Cedars plant in the enormous thrust bearing near the top of the vertical shaft. The bearing became very hot although it had plenty of oil. A special study of the trouble disclosed the fact that the heating was produced by a very low voltage (about half a volt) thermo-electric current. A large ring, which was used to support the bearing, was insulated, and after this had been done, there was no more trouble due to heating in the thrust bearing.

Mr. Wilson stated that the big overhead electric traveling crane installed in this plant for handling the huge generators has the largest capacity of any crane in Canada. Its lifting capacity is 350 tons.

The Shawinigan Falls Plant

The development at Shawinigan Falls is one of the most important in Canada. The plant is about 87 miles north-east of Montreal on the St. Maurice River. The available head of water is 145 feet. There are two power-houses. The machinery includes three 9,000 horse power turbines, each

direct connected to two generators of 3,750 kilowatt and 2,000 kilowatt capacity, 2-phase, 30 cycle, 2,200 volt; also two 10,500 horse power turbines, direct connected to two 6,600 kilowatt generators, and a 10,500 horse power turbine direct connected to an 8,000 kilowatt generator. The above equipment is in power house No. 1, and does not furnish any power for Montreal. The plant was installed in 1902.

Power house No. 2 is equipped with five 18,000 horse power turbines, each consisting of a pair of water wheels mounted on a single shaft, direct connected to five 15,000 kilovolt-ampere, 3-phase, 600 volt generators. One of these generators produces a frequency of 30, but the other four generators give a frequency of 63. Transformers step up the voltage from 6,600 volts to 100,000 volts for Montreal service.

Trouble during cold weather, especially in the spring of the year, has been encountered by the water freezing for a thickness of about four inches all around the inside of the six steel penstocks of power house No. 1. Four of these penstocks are nine feet inside diameter and two are 12 feet diameter; all are approximately 550 feet long. When the thaw came, this mass of ice, coating the interior of the penstocks, would slide down into the turbine and block them.

Power house No. 2 is provided with five steel penstocks 14 feet inside diameter and 600 feet long. Each is enclosed inside of another and larger set of cylindrical covers with an air space of about 3 feet all around. This seems to do away with the freezing except during exceptionally cold weather, when warm air is forced into this air space from power house No. 2, thus keeping the penstocks warm. This scheme adds materially to the dependability of the service.

The Laurentide Plant at Grand Mere

The Laurentide plant supplies power to the Shawinigan Company, and is located about 92 miles north-east of Montreal, on the St. Maurice River. The available head of water is 83 feet. Six 20,000 horse power, vertical shaft turbines are direct connected to six 15,000 kilovolt-ampere, 3-phase, 63 cycle, 6,600 volt generators. Provision is made for the installation of three additional units for future growth. Transformers step up the voltage from 6,600 to 100,000 volts. This plant was finished in 1916.

Mr. Wilson concluded his remarks by saying that his company was looking ahead and preparing for rapid strides to keep pace with the demand for electrical power for years to come.

Twenty Per Cent. Lighting Bill Penalty Exorbitant

The Public Service Commission of Pennsylvania has handed down a decision in a case against the Newmanstown Electric Light & Power Co., Lebanon, holding that a 20% penalty for failure to pay bills for electric service in 10 days, as provided by rules of the company, is "both unreasonable and exorbitant and is out of line with the usual and ordinary penalty imposed by utilities for that purpose." In ordering the company to amend its rules in this respect, the Commission says: "There is no occasion to impose an exorbitant penalty to enforce prompt payment of a bill, since a public utility has within its power the right to discontinue the service for non-payment of bills."

The thirty-first annual convention of the Canadian Electrical Association will be held at the Chateau Frontenac, Quebec City, Que., on June 15, 16 and 17. Mr. Eugene Vinet, 601 Power Building, Montreal, is secretary of the Association and Mr. A. Monro Grier, K.C., Toronto, is the president.

Cost of Power Supply as Influenced by the Present Economic Trend

Discussed Under Two Main Divisions (a) Fixed Charges (b) Operating Costs—
Under Both Headings Increase from Two to Two and a Half
Times—Influence of Power Factor on Power Rates

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It is hardly necessary to say that the cost of producing and distributing electric service has risen during the last few years. It is the object of this paper, first, to make an analysis of the degree by which these costs have risen, and second, to suggest methods of rate making for electric service that will tend to allow for such increases in the future.

First, to take up the matter of the degree by which the costs of electric service have increased during the last few years. There are two major divisions in these items of cost. These are: A—Fixed charges. B—Operating costs.

A—Fixed Charges

The fixed charges, on a power plant are usually taken to consist of the items of interest, depreciation, taxes, and insurance. All of these items are assessed against the first cost of the plant and equipment necessary to give service. The first step in our analysis, therefore, is to ascertain the change in cost of the plant and equipment necessary to give service to-day, as compared with one for the same service before the late war exerted its influence in increasing prices. Steel and copper are the largest single items of raw material that enter into the cost of equipment for power plants. Taking first, iron and steel products. These show some very marked changes during the last five or six years. For instance, the average price of pig iron during 1919 was 2.2 times the average during 1914. The highest point touched by pig iron during the period of 1914 to 1919 was nearly four times the average of the year 1914. The composite average of finished steel showed just about the same variations as might have been expected. Sheet bars, and sheet steels produced from them, show a little greater than average increase. This is important to our inquiry, since sheet steels enter very largely into the manufacture of electrical equipment. Black sheet steel, for instance, averaged 2.34 times as high in price in 1919 as it did in 1914, and the highest price touched during the period of 1914 to 1919, inclusive, was nearly four and a quarter times the average 1914 price. Briefly, the ruling price of steel products has risen to approximately double what these same products could be purchased for before the war. Steel is the largest single item that enters the cost of a power plant.

When we come to consider copper, we find a somewhat checkered career during the last few years. The average price in New York for copper during 1914 was 13.61c and in 1919 was 19.49c, or an increase of 43%. However, in 1917 the price touched 36c, or more than two and one half times the average of 1914. Undoubtedly the government's move in 1917 in fixing prices kept copper from going to a much higher level. This commodity has reacted to the law of supply and demand more readily than some others and the present price is very nearly the same as the average price during 1914. However, if we had been obliged to build a power plant during the last two or three years, we would

have had to pay approximately twice as much for our copper than the same plant erected in 1914. This is the significant thing that we must bear in mind in making our analysis.

But, after all, it is not so much the raw materials that effect the final cost of a power plant, but the actual cost of the various items that enter the finished plant. An analysis of the rise in cost of steel and copper is of interest only in showing the reason for the rise in cost of generators, transformers, switches, meters, etc., that go to make up a complete power plant. By the courtesy of one of the large electric manufacturing companies, I am able to incorporate some data on the actual increases in cost that have taken place in various items of equipment that enter a complete plant. The data at hand covers the period from 1910 to 1920, inclusive. It is interesting, first, to note that costs remained very uniform from 1910 to 1914, there being a slight drop averaging perhaps 5% between these two years. Between 1914 and 1915 most items show a slight further drop in price. Beginning in 1915 there has been a rapid and steady increase in the price of all items entering the equipment of a power house. Some naturally show more increase than others, but all show an increase. Some of the items and the amounts by which the 1920 price is increased over the 1914 price are given in the following table:

Increase in 1920 Costs Over 1914

Turbo Generators	225.%
Motor Generator Sets	147.%
Rotary Convertors	91.%
Transformers (Power)	125.%
Transformers (Distributing)	58.%
Voltage Regulators	48.%
Switchboard Panels	126.%
Oil Circuit Breakers	79.%
Watthour Meters (single phase)	38.%
Watthour Meters (polyphase)	78.%
Frequency Changer Sets	101.%

In addition to equipment, a complete power plant must include lands and buildings. The actual amount of the increase in these items at present over what would have obtained five years, or so ago, is difficult to estimate, but we all know that there has been a marked increase in these. The building trades have shown a particularly marked increase, due largely to the much higher labor and material costs that have ruled during the last few years. There is probably no class of labor that has increased more rapidly in cost than that employed in the building trades.

An article appearing in the January 29th issue of the Literary Digest discusses this question of the increase in prices of all commodities during the last few years. According to this article, the so-called "index figure" has increased to nearly two and three-quarters the value it had during 1914. This "index figure" is the average price of several hundred standard commodities, each weighted according to the amount of that particular article used.

Taking all these into account, it is my estimate, based on

a considerably detailed study, that the cost of a plant necessary to produce, distribute, and maintain electric service to-day is not less than 225% of what the same plant would have cost in pre-war days. In making this estimate, I have in mind plants of the character used in any large city for supplying general service to the public. According to my best estimate, based on quotations upon the necessary equipment, if we built the plant necessary to furnish this centre with electric service to-day, it would cost approximately two and one-quarter times as much as it would have cost if built during the period from 1910 to 1914, inclusive.

Some one may object that this has no effect on the cost of producing power, since practically all the capital expenditures necessary for furnishing electric service to this centre were made before the increase in cost took place, and therefore, the present consumers should not be burdened with this increase in present capital costs. This is only partially true. Any power plant such as that here in Toronto, for instance, is constantly growing. Ten per cent., per year, increase in the production of power is not at all unusual these days, and during the war period this increase in the demand on power plants was often greater than this. A plant big enough for its load in 1914 would not take care of conditions at present. The normal growth during the last five or six years would demand an increase in the normal plant to serve a community. This increase had to be put in at a higher cost; as time goes on the older parts of such a plant are amortized and eventually taken out of service and scrapped. The recently purchased part of the plant must of course be considered at present price levels. Whether the older portions should be considered as of present value of equivalent equipment, or as of the value at time of purchase, is a question that I will not discuss at this time. I might observe, however, that those of you who are paying rent these days are paying on the basis of the present value and not of the original cost of the property you occupy. There is surely as much logic in power costs following the rising costs of equipment as there is in rents following the rising values of buildings.

In this connection, there is another point that should be mentioned, and that is, that it is not the first cost, but the carrying cost, that enters the final power cost. First cost is only one item in establishing fixed charges; interest, depreciation, taxes and insurance, of course, vary with the first cost, but they may also vary independent of first cost. Thus, during the last few years, we have seen a marked increase in interest rates. Bonds, which five or six years ago could be floated on a basis of four to six per cent. return, must now pay six to nine per cent. Therefore, the promoter of a power plant to-day must not only pay more than twice as much for his equipment as he did six years ago, but when he goes into the money market to borrow his money for the plant, he must pay an interest rate approximately 50% higher than he did six years ago. Here again, however, the objection may be made that the plant now furnishing our power was purchased at the old prices and, if wisely financed, carries the old interest rate. I again refuse to discuss the question whether the shrinkage of the purchasing power of the dollar should be taken into consideration in fixing the rates for electric service, but will simply point out that due to the wearing out and obsolescence of equipment, this shrinkage must eventually be recognized.

B—Operating Costs

While there may be some economic question as to the present value of the item of fixed charges in the cost of power, there are other items where there can be no question of the increase. In addition to fixed charges, the operating costs must be considered, in arriving at the total cost of power. The largest item in these costs is that of fuel, and this in turn depends on the cost of coal. The cost of coal has made a very marked and very real advance during the last

few years. Coal costs have not only advanced at the mines, but the costs of freights have also increased during the war period. A certain specific plant located in New England, for which I have the data on coal costs for the last ten years, shows an average of \$14.00 per ton during 1920, as against \$5.50 per ton during 1914, or an advance of 154%. Some more figures that have been supplied by Babson, show that anthracite coal in New York has advanced from \$5.75 in 1914 to \$10.45 in 1920, or an advance of 81%. Some further figures, which I have secured from practically every coal producing state in the Union, show that coal at the mine mouth has increased all the way from 45% as a minimum to 168% as a maximum. The grand average for coal at the mine mouth shows an increase of 129% in cost of 1920 over 1914. As I said above, these increases are real. The power producing companies must pay these advances or they do not get any coal. Coal enters to a very considerable degree in power costs—the exact degree will be estimated later in this discussion.

Considering all the data I have been able to assemble on this point, I should estimate that the cost of fuel to-day is at least 125% above what it was in 1914. This figure will be used in making my estimates on the increase in fuel costs in a power plant of to-day as compared with the same plant in 1914.

The next item that demands our attention in making our analysis is labor. Labor is of course necessary in the operation of any power plant; by labor I mean the wages and salaries that are paid to any and all employees necessary in the operation of the plant. The U. S. Dept. of Labor is the source of data that I have on the wage earner. As to increases that have taken place in the salaries of salaried men, I have no very complete data, but the total of this is small compared to the total amounts involved so that an error in its estimate is not very important.

A review of the statistics gathered by the Bureau of Labor Statistics, U.S. Dept. of Labor, shows that the rates of wages for power plant operators during 1920 may safely be taken as 85% in excess of what they were in 1914. For salaried employees, I am estimating the increase at 40%.

Based on the foregoing estimates as to increases in the individual items, my estimate of the increase in cost of producing power ready for distribution in a modern power plant in 1920 as compared to 1914, is given in the following table. For the purposes of my estimate, I have assumed that the plant would have a maximum capacity of 100,000 kw. consisting of five units of 20,000 kw. each; that the yearly load factor is 40% and the daily load factor 55%; that the fuel available is bituminous coal of 13,500 B.T.U. per lb., and that this coal in 1914 cost \$2.75 per ton, and in 1920 \$6.18 per ton; that 2.1 lbs. of coal were required to produce a kw. hour in both cases; that the plant cost was \$60.00 per kw. in 1914 and \$135.00 per kw. in 1920; that the fixed charges were at the rate of 12% in 1914 and 15% in 1920; that 350,000,000 (350 million) kw. hours were generated and distributed in each case. Based on all of these assumptions, the final comparison of power costs in 1914 to those in 1920 is given in the following table:

Item	Cost per kw. Hour in Cents	
	1914	1920
Fixed Charges	.206	.579
Operation:		
Fuel	.289	.649
Oil, waste, and supplies	.012	.024
Labor	.041	.076
Maintenance:		
Materials	.026	.053
Labor	.023	.039
Administration	.008	.011
Totals	.603	1.431

The above table is more or less typical of all steam

plants, at least, insofar as it compares conditions in 1914 and 1920. If we vary the location or the size or the character of the steam plant, various items will of course change, but the comparison between 1914 and 1920 conditions will not show very much variation from a power cost of two to two and one-half times as much in 1920 as it was in 1914.

When we come to consider water powers in making a similar analysis, we must bear in mind that fuel costs are entirely absent, but that this absence is largely offset by a much higher item of fixed charges. The first cost of the usual water power plant, itself, is not only higher than a steam plant, but as a rule it lies a considerable distance from the market so that there is a considerable item of transmission cost and losses that the steam plant does not, in general, have to bear. An advantage possessed by the typical water power plant is that the dams, canals, and other works built in connection therewith, are usually of a more permanent character than in a steam power plant, and they therefore carry a lower rate of depreciation. On the other hand, the metallic structures used in connection with the long distance transmission system that must, in general, be considered as a part of any typical water power plant should carry a somewhat higher depreciation rate than the steam plant would carry. All in all, the depreciation rate that should be applied to a water power plant is perhaps slightly lower than that on a steam plant. The items of interest and taxes would presumably be the same for a water power plant as for a steam plant.

As indicated above, the first cost of a water power plant is in general considerably higher than in a steam plant. It is impossible to make any general statement of the amount of this difference in first cost since it will depend on many indeterminate things. The cost of dams, canals, storage reservoirs and the like, vary over an exceedingly wide range and the cost of the transmission system is a function of the amount of power to be transmitted and also of the distance of transmission. There is only one real limit to the cost of a water power installation, and that is, the economic consideration that the market cannot afford to pay more for water power than for the same service rendered by steam. However, the ratio between the cost of a water power plant in 1914 and in 1920 may safely be taken to be at least as much as that determined for steam plants. For steam plants we arrived at the figure of 2.25 to represent the ratio of costs in 1920 as compared to 1914; I see no reason for departing from this same figure for water power plants. The costs of buildings and other construction work which constitute the major part of any water power project has certainly risen by at least as large a ratio as machinery costs. I, therefore, feel justified in taking the ratio 2.25 to represent 1920 water power plant costs when compared to 1914.

Cost of Water Power

The following table giving my estimate of the cost of water power uses this ratio. The other assumptions used in making my estimates are as follows: That the plant would have a capacity of 100,000 kw. (the same as assumed for the steam plant); that the yearly load factor would be 40% and the daily load factor 55%; that the plant cost was \$140. per

kw. in 1914 and \$315. per kw. in 1920; that fixed charges on the water power plant were 11% in 1914 and 14% in 1920; that the plant is located 75 miles from its market; that 350,000,000, (350 million) kw. hours were generated and distributed in each year.

It is somewhat interesting to note from the preceding tables of estimated cost that water power has increased in cost more than steam; a ratio of 2.37 for steam and 2.67 for water. The reason, of course is that practically the entire cost of water power is in fixed charges and the increase in interest rate has increased these charges faster than for steam where fuel and labor costs enter more largely.

The above tables include only those costs that are necessary to produce the necessary power and put it on the bus bars at the steam generating plant, or the step-down substations of the water power plant, ready for distribution from that point. To get the power to the ultimate consumer, it is necessary to add the costs of distribution, metering, collection of bills, distribution losses, etc. These items vary considerably, depending upon the amounts of power distributed, the layout of the distributing system and many other items that it is difficult to take into consideration in generalizing, as I necessarily must. The main point that I wish to make is that the cost of power has gone up during the last few years much more than most of us realize. The items not considered in the above tabulation have risen during the last few years, but possibly not quite so much as the above tabulation indicates. The main thing is that the costs of power production and distribution have risen from two to two and three-quarters times what they were six years ago.

Rates Have Not Kept Step

The question may now be properly asked: Have the rates for electric service gone up in proportion to the increase in the cost of production? The obvious answer to this query is **no**—at least, it is obvious to those of us who have been familiar with the trend of electric service rates during the last few years. The rates for electric service have made some advance during the last few years, but they have not begun to keep step with the advances in the cost of producing that service.

The most noticeable change that has occurred in rates during the last few years is the fairly general adoption of the so-called "coal clause." As indicated in our analysis, coal is by far the largest item in the operating costs in the producing of electric power, when that power is produced from steam. In supplying large consumers of power, the item of fuel may usually be expected to amount to about three-fourths of the operating costs—based on present fuel prices—and when this item advances, in cost, in the manner it has during the last few years, it has become impossible to serve power at the old rates. Nearly all public utilities have, therefore, recognized this by basing the former charges per kw. hour on a standardized cost of coal, and for each increment in the actual cost of coal over or under this standardized price of coal, the price of the kw. hours consumed is proportionately increased or decreased. This procedure is entirely logical. In some cases, there has been an arbitrary increase in the prices for power per kw. hour, without reference to the price of fuel. In general, this method is not so satisfactory as a coal clause, since it does not automatically recede when the cost of fuel recedes.

The fundamental object of any rate for electric service is to distribute the burden of the service **equitably** among all users of that service, and at the same time return a sufficient amount to the utility to pay the cost of furnishing the service and leave a reasonable profit to the utility.

Practically all rate makers in the past have recognized two major divisions in rates for electric service. One of these major divisions recognizes the operating costs. It is

Item	Cost per kw. Hour in Cents	
	1914	1920
Fixed charges .....	.440	1.260
Operation:		
Oil, waste, and supplies .....	.009	.018
Labor .....	.033	.061
Maintenance:		
Materials .....	.024	.048
Labor .....	.028	.052
Administration .....	.008	.011
Totals	542	1.450

generally recognized that this class of costs is, as nearly as may be, proportional to the amount of energy delivered. Fuel, for instance, is the largest single item in these costs, and the amount of fuel required to serve a given consumer is practically in proportion to the kw. hours consumed. When the cost of fuel advances, it is perfectly logical—as has been done—to advance the price of this major division of the rate. It is also perfectly logical to make the amount of this advance proportional—as nearly as may be—to the kw. hours consumed. The coal clause accomplishes this object as equitably as it is possible to do. A slight arbitrary advance in the price per kw. hour might be installed on account of the increase in the cost of operating labor and supplies, but these items are so small that they are easily covered by a slight variation in coal cost. It is my opinion, and I think it is generally conceded, that the coal clause makes the most equitable recognition of the variation in operating cost that we are able to get. The very fact that it has been so generally adopted is evidence of this general recognition. It is unfortunate that some of our utility commissions have ruled against this method of adjusting rates. Such an adverse ruling shows that these commissions have been governed by considerations other than fundamental engineering considerations.

While this method serves very satisfactorily for taking care of variation of those costs that vary with the amount of energy consumed, it does not, and cannot, recognize equitably those costs which are largely independent of the energy consumed, but which vary with the amount of equipment which must be allocated to any individual user.

This class of costs is provided for in the second major division into which the rate for service is usually divided, usually called the "demand" charge. It is to this major division of demand charges that the utility must look for compensation for the item of fixed charges in its costs. It is obvious that the equitable allocation of fixed charges among all consumers is not in proportion to the amount of energy used, but to the amount of equipment that must be provided for any given consumer. In other words, load factor must be considered in any equitable allocation of costs among the consumers of power. For instance, if two users of service each require the installation of 1,000 kw. of transformers, together with the quota of transmission, distributing and generating system that must be provided for that installation, and A uses his service 24 hours per day, while B uses his only 4 hours per day, it is obvious that the demand portion of the charges to each is the same, while the energy portion of A is approximately six times that of B. B requires just as much plant to serve him as A and should bear his just proportion of the carrying charges on that portion of the utilities plant that is installed and maintained for his benefit. A, however, requires more coal to be burned to produce his power and this is equitably recognized in the energy charge.

It is of interest to note the degree by which the item of fixed charges influences the cost of water power as compared with steam. In steam plants the item of fixed charges makes up between 30% and 40% of the total cost of the power, while in water power plants it constitutes from 80% to 90% of the total. In steam plants, therefore, the energy portion of the rate is somewhat more important than the demand portion, while in water power plants the importance of the demand portion of the rate overshadows the energy portion many times.

It would be more logical in a water power plant, if either of the two elements is to be disregarded, to neglect the measurement of kilowatt hours and the energy charge that goes with this measurement, provided there could be substituted an accurate and satisfactory demand charge. In a water power plant practically the only thing that determines

the cost of serving a given user of service is the value of the equipment that must be allocated to render him his service. In a steam plant it is essential to measure both the demand and the energy, but in a water power plant the energy charge could be dispensed with without doing much injustice.

An examination of the rate increases during the last few years shows that while some changes have been made in the demand rates in some localities, such an increase has not been general. Undoubtedly, the reason for this is that in most cases the same plant is being used now as before the increase in plant cost went into effect, and that in general, public utilities either have not been permitted to raise their demand rates, or have not thought it wise to do so. There is a broad economic question involved in this matter; in brief, the question is this: Shall the public utility collect a demand rate based on the price he paid for his plant before the war or shall it be on the basis of the price he would have to pay for that equipment to-day? Whichever way we answer that question to-day, we must recognize that the increase in equipment cost must eventually determine this question. The power we use to-day is perhaps developed from equipment purchased five or more years ago, but the power we use some years hence must be developed from equipment purchased to-day. We must postpone this increase in demand rates, but we cannot deny it eventually.

The Demand Charge

A glance at the preceding table, giving the costs of steam generated power, shows that at least one-third of the cost of power consists of fixed charges; it is this portion of the costs that is expected to be covered by the demand charge. In the case of water power, the fixed charge portion of the cost of power is in general very much larger than in steam plants, while, of course, the item of fuel in the operating costs is entirely absent. In a water power plant, as indicated above, we may expect the item of fixed charges to rise to 80% or 90% of the total costs of power instead of the 30% to 40% that may be expected in steam power practice. It is highly important, therefore, that this part of the consumer's bill be accurately determined, and this is particularly true in water power plants. In the past, owing to the absence of suitable instruments for the determination of demand, it has often—not to say usually—been the custom to estimate this part of a consumer's bill by basing it on the amount of equipment he had installed. It has been customary to aggregate the nameplate rating of all the motors that a consumer had and then base the demand charge on some arbitrary proportion of this aggregate. I wish to take this occasion to point out some of the objections to and inconsistencies of this practice. In the first place it puts a penalty on individual motor drive. It is admitted that the aggregate capacity of the individual motors required to drive a hundred separate machines is larger than that of a single motor to drive them all. On the other hand, the losses in the belting and shafting that are necessary if a single motor were used, will in general be much less than if all are driven by belting and shafting from a single motor. A system of charging for demand that puts a penalty on the individual motor drive is—to say the least—shortsighted.

A second vital objection to the method of estimating demand from horsepower ratings of the motors lies in the moot question of just what is meant by horsepower in a motor. The horsepower rating of a motor is necessarily tied up to the temperature at which that horsepower is developed. The market to-day provides standard lines of motors at 50° rise, 40° rise, and 35° rise. A 50° motor is supposed never to carry more than its rating, while the lower temperature rise machines will carry at least 25% overload for at least two hours, and much larger overloads for shorter periods. If the practice of estimating demand rates from horsepower

ratings is to continue, cognizance must be taken of the temperature ratings of the motors used. And then, there are some types of load where horsepower rating has no meaning, such as on elevators and the like. The man who can bring order out of that chaos, and estimate an equitable demand rate based on nameplate ratings is wiser than most electrical engineers. And then, after all, it is a consumer's actual use of a demand; it is the actual draft he makes on the system supplying him, that should determine his demand rate, and not his potential possibilities.

Demand rate should be a **measured** and not an estimated or inferred quantity.

Another much needed modification in the application of demand rates is the necessity of recognizing power factor therein. The capacity of the transformers, transmission line, distribution circuits, and generators, to supply a given consumer, is fixed by his kv.a. and not his kw. The consumer that takes his demand at 100% power factor should not pay the same rate as another that has a 50% power factor, since the equipment needed in the former case is only one-half as great as that needed in the latter. The most frequent cause of bad power factor is underloaded induction motors. Using motors that are too big for their jobs is not uncommon. The best cure for this evil is to recognize power factor in the demand rate, so that the user of power who makes a proper application of motors to his service can earn a bonus in his power demand rate. Most contracts for power have a clause recognizing power factor, but up-to-date, this recognition has been largely theoretical only, the reason being, that there is no commercial method of measuring kv.a. of demand. Practically all commercial methods of measuring either energy or demand recognize watts, and watts only, and before we can recognize by measurement the kv.a. of demand, there is not much use in incorporating any power factor clause in our power contracts.

Recognizing Power Factor

I wish to take this opportunity to outline and pass on a method of recognizing power factor. The method has many points of interest to those engineers who are charged with the responsibility of making rates for service—particularly power service.

The standard wattmeter of commerce, no matter who makes it, or whether it be indicating, integrating, or demand, is an instrument usually of a high order insofar as its accuracy is concerned. It measures the true watts or watthours or watts of demand with a very high degree of accuracy. The quantity thus measured is $EI \cos A$, where E is the voltage; I the current, and A the phase angle between E and I . If now we take one of these standard watt meters of any make whatever, and apply a voltage which has been shifted in phase by any arbitrary amount, which we will call B , the instrument will then measure $EI \cos (A+B)$. I use the double sign for the angle B advisably since this sign will depend upon the direction of angular phase shift, as well as the direction of phase rotation in the polyphase meter to which it is applied. If B be chosen equal to A and of the proper phase rotation, the quantity $A-B$ will become zero and the new quantity measured will be volt amperes, or volt ampere hours of maximum demand, as the case may be. It is also true that there may be a considerable error in choosing the angle B without a proportionate error in the volt amperes measured. For instance, there can be a difference between A and B of eight degrees before the error in $EI \cos (A-B)$ departs from EI by more than 1%; for a 2% error in EI , this difference may rise to 11.5 degrees and it does not become 5% until the angular difference between A and B rises to above 18°.

In the following table these limits of error are given for a number of definite degrees of phase shift. If a phase shift

corresponding to the column headed O is applied to any wattmeter the error of measurement remains within the limits of the other columns so long as the power-factor remains within the limits indicated in these columns.

Error	5%	2%	1%	0%	1%	2%	5%
Power Factors	.947	.903	.877	.80	.708	.655	.573
	.820	.747	.707	.60	.481	.429	.320

For instance, if a phase shift of 36.87 degrees corresponding to 60% power-factor is applied to the voltage on a given wattmeter, this wattmeter will then read volt amperes with an error of less than 1% as long as the power factor remains anywhere between .481 and .707; the error will be less than 2% for any power factor between .429 and .747 and less than 5% for any power factor between .320 and .820. The range of power factor thus is very large for a comparatively small error. If, therefore, the power factor of a load is known in advance and is fairly uniform, it is possible to measure the volt amperes, or volt ampere hours, or volt amperes of maximum demand with a reasonable degree of accuracy by means of any standard wattmeter and a phase shifting voltage transformer. Unfortunately, the average power load does not possess a high degree of uniformity in its power factor; power factor varies over wide limits, depending upon the load. However, the power factor that exists in a given plant at the time of its maximum demand can usually be determined with a sufficient degree of accuracy so that its **maximum demand in volt amperes** can be determined by this method, with an entirely satisfactory degree of accuracy. This is the quantity that we are particularly interested in. Bad power factor in a given customer's load makes necessary more equipment by the power company supplying the load and the customer should have it within his power to earn a bonus for good power factor or a penalty for bad, depending on the equipment he uses. The fact that bad power factor entails inefficient use of his electrical equipment is already recognized in the energy portion of his rate due to the increased kw.h. consumed. The way to correct bad power factor is to make it affect the demand portion of the user's bill and this can be done by the method above outlined. It should be particularly noted, however, that it is the demand portion of the bill for power that should be subject to correction for power factor and not the energy portion. There is no defense for increasing the energy portion of the bill on account of bad power factor; in other words, there is no defense for reading the volt-ampere hours and then charging for the energy portion of the user's bill on the basis of the volt-ampere hours instead of the watt hours.

Another thing that might be noted is that any error in assuming the power factor of maximum demand results in a reduction of the demand rather than an increase. The final result therefore is a smaller bill for service than if the true volt amperes of demand were used as a basis for the bill. This is the "safe" direction for an error, if any is to be made; the user cannot attack the method on the grounds of an over registration of his demand.

There are some who will undoubtedly object to this method on the ground that it is impossible to predetermine the power-factor of a user's maximum demand with sufficient accuracy to make it available for commercial use. For such I would make still another suggestion, and that is, to use two demand meters, one measuring the watts of demand of $EI \cos A$, and the other having an arbitrary phase shift of 90° applied to its voltage terminals. The quantity which a demand meter so connected will read is $EI \cos (A+90)$ equal to $-EI \sin A$. The quantity $EI \sin A$ is known as the **reactive volt amperes** of the load.

In passing I should like to suggest the shortening of this name to "quads." The source of this name is self-evident; it is the **quadrature component** of the load, the real

component being the watts or $EI \cos. A$. This name is much shorter as well as more expressive than the term **reactive volt amperes** and is not so apt to be confused with the term **volt amperes** which is always the resultant of watts and quads. The name is not new, having been used for many years by the engineers of one of the important manufacturers of motors in the U.S.

When both watts and quads have been measured, volt amperes can readily be determined by the well known relation

$$\text{Volt amperes} = EI = \sqrt{(EI \cos. A)^2 + (EI \sin. B)^2}$$

This method will, therefore, determine the volt amperes of maximum demand independent of power factor, whether leading or lagging and whether of motor or generator. The only assumption necessary is that the watts and quads in the circuit occur at the same time. Usually this can be safely assumed. It is certainly true of a single induction motor and is also true of any given group of induction motors. Since it is the underloaded induction motor that is the most usual source of low power factor, this method is applicable to the normal power load where it becomes important to determine the volt amperes or the power factor of maximum demand. There may be some slight departure from simultaneousness of maxima in watts and quads when different groupings of motors is practiced, or when there is a marked change in the value of the applied voltage. Also, where synchronous motors are used the two maxima will not necessarily occur simultaneously. However, in such cases, it would be entirely logical for the supplying company to take the position that they are interested in keeping both the watts and the quads at a maximum and that they will assume that they do occur simultaneously. The objection to the method is that if the two maxima do not occur simultaneously, there is an over-registration of the maximum demand and a possible occasion for protest on the part of the user. As a working alternative for motor loads, the separate determination of watts and quads might be obtained, thereby determining the approximate power factor of the maximum demand; a single demand meter with a phase shift of the proper amount could then be installed in order to obtain a record for billing purposes. Where synchronous motors are used, however, it is entirely logical to use the two meter method, determining watts and quads separately; it is important to the supplying company that such motors be used constantly in such a manner as to reduce the quads to a maximum at all times, and it is the maximum value of the quads that is of interest to the supplying company, whether that maximum value coincides in time with the maximum of the watts or not.

There are a number of modifications of the foregoing suggestions that have been made from time to time and which it might be well to review. For instance, it has long been known that any polyphase wattmeter on a two-phase circuit would measure quads by simply interchanging its shunt connections. It is also well known that the same is true with a polyphase wattmeter on a three-phase circuit and that when so used the reading must be divided by the factor 1.155 in order to obtain true quads. Also, it has been recognized that such a measurement of quads on a three-phase circuit is not accurate with an unbalanced load. Measurement of quads on three-phase is accurate only when the voltage applied to the meter has been rotated through an angle of 90 degrees from that which gives correct readings as a wattmeter. When quads are measured by such an instrument, it gives accurate results independent of load unbalance, provided only that the applied three-phase voltage is balanced; there must be a considerable unbalance in voltage before the error becomes appreciable.

The practical man will ask: how can the methods outlined be applied in actual practice? For three-phase circuits

—which includes by far the greatest majority of power circuits—it is possible to obtain phase shifts of 30°, 60°, or 90°, by proper manipulation of the line voltage connections, provided the neutral connection is available; on a two-phase circuit only a 90° shift is available. To obtain other degrees of phase shift it is necessary to use some form of phase shifting transformer. Such a transformer is not a difficult thing to build and a few words concerning its possibilities may be in order.

First, I will cite a specific case in which the engineers of a very large power supplying district in Canada asked for a phase shifting transformer to be used in connection with demand meters on their system. These specifications called for a transformer that would shift the phase of the voltage to be applied to the demand meter by a degree corresponding to power factors of 80% and 60%; these two power factors were alternates, either to be made available at the user's option. These three power factors correspond respectively to angular shifts of 36.87° and 53.13°. The range in power factor allowable without exceeding a given error is given in the table on a preceding page.

A sample phase shifting transformer was made up to these specifications and tested both for ratio and phase shift. It proved entirely satisfactory from both these points of view; the use of these phase shifting transformers in connection with a standard demand meter will, therefore, place this supplier of power in a position to recognize power factor in their rates for service. In case the power factor of the load under measurement is not known with a sufficient accuracy to determine the proper phase shift to apply, two demand meters may be used, one measuring watts and the other quads. With both watts and quads determined, it is easy to obtain the volt amperes by combining these two components in the well-known manner.

Physically the phase shifting transformer is a small affair weighing perhaps nine or ten pounds, complete, and it is not a serious matter to contemplate its addition to the standard meter equipment.

Summary :

- (1) Costs of producing power have risen to a marked degree during the last few years. These increases affect both the operating costs and the fixed charges.
- (2) The increase in operating costs can logically and conveniently be recognized by increasing the energy rate at which power is sold. A convenient and logical method for accomplishing this result—and one much used in practice—is to incorporate a coal clause in the power contract, by which the energy rate varies either up or down depending upon the price of coal.
- (3) The necessity of increasing the demand portion of power rates is not so immediately apparent as that for increasing the energy portion, but must eventually be recognized as soon as the increased cost of equipment has had time to make its effect felt.
- (4) The demand portion of a power should be based on a measured quantity and not inferred from the installed equipment.
- (5) Power-factor should be recognized in the demand portion of a power rate. A method recognizing power-factor is suggested.

The report of the West Kootenay Power & Light Company, which has just been published, covers sixteen months ending December 31, 1920. During that period the gross earnings were \$794,101, as compared with \$560,129 for the twelve months preceding. The report states that expenses have been unusually heavy and a large amount has been set aside for depreciation. The regular payments on the common dividends had to be made in part from the profit and loss surplus account.

Letter to the Editor

Editor, Electrical News:—

In the report of my lecture on "electrons" there appears the statement "that there is a charge of 6.282 million million electrons in a condenser of one micro-farad capacity charged to one volt." This is an error. What I intended to say was that there are 6.282 million million million electrons in one coulomb of electricity and that in a one micro-farad condenser charged to one volt there are 6.282 million million electrons. This figure is arrived at in the following manner: Professor Millikan's measurements showed that the charge on an electron measured in electrostatic units is equal to

$$4.774 \times 10^{-10}$$

from which we see that the unit quantity of electricity in electrostatic measure is equal to

$$\frac{1}{4.774 \times 10^{-10}} = 2.094 \times 10^9$$

Multiplying this quantity by 2.999×10^{10} which is the ratio of the electro-magnetic unit of quantity to the electro-static unit of quantity gives us

$$6.282 \times 10^{19}$$

Now the practical unit of quantity or coulomb is only one-tenth as great as the electro-magnetic unit of quantity, so that there are

$$6.282 \times 10^{18}$$

or 6.282 million million million electrons in a coulomb of electricity. The quantity of electricity in a condenser of capacity C charged to a potential V is given by $Q = CV$. Taking $C = 1$ micro-farad; $V = 1$ volt: then $Q = 1$ micro-coulomb, or one one millionth of a coulomb, so that a condenser of one micro-farad capacity charged to a potential of one volt, contains 6.282 million million electrons.

In this connection it is interesting to note that Sir William Bragg in the twelfth Kelvin lecture recently delivered before the Institution of Electrical Engineers, speaking on electrons, made the following statement:

"The electrician will gain when he grasps the fact that electricity is not merely measurable in quantity, but that there is already a unit of nature's choice, possibly no more than one unit. We may say with justice that the most wonderful advances in modern physics are the regard for the appreciation of this truth, and we may hope with equal justice that we are yet far from reaping the full benefit."

The unit referred to by Sir William Bragg is the amount of electricity in one electron which through the wonderful precision of Professor Millikan's measurements, is available as a standard in terms of which we can express electrical quantities. Thus we can measure currents in trillions of electrons per second. Suppose as an illustration we adopt Sir William Bragg's suggestion and see how it works out. The International Conference on Electrical Units and Standards which met in London in 1908, defined the four units the ohm, the ampere, the volt and the watt, as follows:

(1) The International ohm is the resistance offered to an unvarying electric current by a column of mercury at the temperature of melting ice, 14.4521 grammes in mass, of a constant cross sectional area and of a length 106.300 centimetres.

(2) The International ampere is the unvarying electric current which when passed through a solution of nitrate of silver in water, in accordance with Specification II attached to these Resolutions, deposits silver at the rate of 0.00111800 of a gramme per second.

(3) The International volt is the electrical pressure which when steadily applied to a conductor whose resistance is one International ohm, will produce a current of one International ampere.

(4) The International watt is the energy expended per second by an unvarying electric current of one International

ampere under an electrical pressure of one International volt.

These definitions may be restated as follows:

(1) The ohm is the resistance of a specified column of mercury.

(2) An unvarying current flow at the rate of 6.282 million million million electrons per second is one ampere.

(3) A volt is that electrical pressure which steadily applied to a resistance of one ohm will cause electrons to flow through at a rate of 6.282 million million million per second.

(4) A watt is the energy expended per second by an unvarying flow of electrons at the rate of 6.282 million million million per second under a pressure of one volt.

As a further illustration suppose we take the definition of the International ampere in terms of the rate of deposition of silver in the silver voltameter or coulometer. This apparatus consists of a silver plate as anode, suspended in a solution of silver nitrate contained in a platinum bowl which serves as cathode. In measuring current with this apparatus the positive terminal of a battery is connected to the silver anode, and the negative terminal to the platinum bowl or cathode. A steady current of electricity is then allowed to flow during a measured interval of time, and then the amount of silver deposited on the platinum bowl is determined by weighing. The gain in weight of the platinum bowl is a measure of the quantity of electricity that has flowed; dividing this gain in weight measured in milligrammes, by 1.118 gives us the quantity of electricity in coulombs. Therefore, when 1.118 milligrammes of silver have been deposited, the total number of electrons that have passed from the platinum bowl to the silver plate is equal to 6.282 million million million. Since both of these are awkward numbers we can simplify the statement somewhat by dividing: thus

$$\frac{6.282 \times 10^{18}}{1.118} = 5.619 \times 10^{18}$$

and we see that for every milligramme of silver that passes from the plate to the bowl 5.619 million million million electrons pass in the opposite direction.

I trust that the above statements will make the relation between quantity of electricity and number of electrons perfectly clear. In the report of my lecture no mention was made of the value for "n," the number of molecules in a cubic centimeter of any gas at standard temperature and pressure, which is

$$n = 27.03 \text{ million million million}$$

This number can be obtained very easily from the number of electrons necessary to deposit one milligramme of silver in the silver coulometer, because the number of atoms of silver deposited is equal to the number of electrons necessary to produce the deposition; there are therefore 5.619 million million million atoms in 1 milligramme of silver. If we multiply this number by the ratio of the molecular weights of silver and hydrogen (117.88/2.0154) and divide by the volume of one milligramme of hydrogen at standard temperature and pressure, we get the number of molecules of hydrogen in unit volume or one cubic centimeter, and by Avogadro's rule this is equal to the number of molecules per cubic centimeter of any gas at the same temperature and pressure. Performing this operation we get:

$$n = \frac{5.619 \times 10^{18} \times 107.88}{2.0154} = 2.703 \times 10^{19}$$

or 27.03 million million million.

In conclusion I do not wish to be understood to say that it would be advisable to define electric quantity in number of electrons, because not only would such a definition be useless on account of the impossibility of counting electrons, but also because we do not know the number of electrons in one coulomb with the same degree of precision that we know its value in other terms. As an aid to a conception of the physical reality of the electron, however, it should be useful.

Yours truly,

W. B. Carmichael

The Electrical Contractor

Preparation of Tenders on House Wiring Jobs Determining Cost of Work and Amount of Profit Always a Serious Consideration

The National Electric Light Association is concerning itself with the difficulties of the electrical contractor, and some time ago appointed a committee to prepare a report covering suggestions on the proper methods to use in the preparation of tenders on house wiring jobs. Mr. R. S. Hale, Edison Electric Illuminating Co., Boston, was appointed chairman of this committee; associated with him were A. L. Nelson, Commonwealth Edison Company, Chicago, C. Renshaw, National Metal Molding Company, Pittsburgh, and R. H. Talman, Consolidated Gas, Electric Light & Power Company, Baltimore. This committee has just brought in a report which is summarized in the latest N. E. L. A. "Bulletin" as follows:

To the contractor the price at which he should do a wiring job is always a serious consideration. To determine prices which will keep his men constantly employed upon profitable work usually requires careful figuring. The average contractor cannot always secure or spare high-grade estimators for the house wiring jobs, but, fortunately, all house wiring is so much alike that, except in unusual cases, it is entirely practicable to have prices on a prearranged schedule instead of estimating each job separately, and this plan is commonly used. Most of the schedules which have been devised for this purpose, however, have been so general and have omitted so many essential details that they have not been satisfactory except where applied within narrow limits. Such schedules, while indicating reasonable profits, perhaps, if averaged for a number of installations of varied types, usually show wide variations in individual cases. A contractor who attempts to wire a number of buildings of a type for which the schedule leaves too little margin, therefore, soon finds himself in trouble.

It is possible, however, to devise schedules which make due allowances for the type of building being wired and which are yet so simple that they can be readily used. One such schedule has been devised by the Commonwealth Edison Company of Chicago and used by it and local contractors for several years. This schedule has been found not merely to give correct prices on the basis of averages, but to yield uniform profits for the individual jobs, thus conforming to sound business principles. It has been used in the pricing of house wiring totalling more than \$500,000 per year, and it has given complete satisfaction. Through the courtesy of the Commonwealth Edison Company this schedule is reproduced, and the following explanation of its fundamental principles is given:

In presenting this schedule, it is not the actual figures which it is desired to show, but rather the general plan on which they have been arranged. The prices themselves were, of course, influenced very largely by the methods of wiring, the wage rates, and the technical requirements prevailing in Chicago. The general principles, however, will

apply anywhere. When these principles are understood, it is a comparatively simple matter for any contractor, or group of contractors, to prepare a similar schedule for particular localities.

Basis of Wiring Schedule

The first and most important principle on which this schedule is based is that, in making up the price for wiring buildings, the service entrance (including the first meter loop and the first circuit) should be covered by a separate item instead of being averaged with the outlets. Additional circuits, when required, should be covered in the same way. In the case of apartment buildings, also, additional metal connections, after the first, should likewise be listed independently.

Second, the effect of the size and type of building on the various items of cost should be recognized, as well as that of the number of stories. A two-storey building having an open attic and an open basement is more easily wired than is a corresponding building with no basement. It is obvious that a three-storey building, even if it has both an attic and basement, will be more difficult to wire than a two-storey building of the same type, on account of the difficulty in reaching the middle storey.

There is another element, also, that has been taken account of in making up the schedule, especially in the matter of residences. A house with three or four stories is usually of more expensive construction than one of lesser size, and the wiremen must exercise greater care and hence make less speed in working in it.

The third principle upon which the schedule is based is that certain types of outlets are inherently more costly than others. A ceiling outlet, for instance, costs the least of all on account of the much greater ease of fishing between floor and ceiling, and the shorter average length of conductors per outlet.

It will be seen from the schedule that in addition to the gradations in prices for the several items in accordance with the above, the prices have also been carefully arranged to care for other variations in procedure, which have been found by experience to affect the cost. It will be noticed, for instance, that for service entrances the price is less for a one-storey building with a flat roof than for a similar building with a peak roof, or for buildings of more stories. This is due to a local requirement in Chicago that the service entrance in conduit must extend to the level of the second-storey ceiling, or, on buildings of less than two stories, to the highest point on the building. A certain length of conduit, conductors and the like, with the installation labor, is saved, therefore, on one-storey flat roof buildings on account of their lesser height.

In apartment buildings an additional charge is made on circuits where switches have been omitted. This will be understood when it is considered that switch outlets are used as junctions and as pull boxes. The work is made more difficult by the omission of switch outlets, and the increase in cost due to this item increases with the size of the building.

Outlets in public halls in apartments cost more than other outlets, because, usually, they are supplied from a separate meter, and the average length of conductors for

such outlets is greater than in the living rooms. Apartments over stores are more difficult to wire, because of the lack of partitions in the stores. It is harder to reach such apartments with conductors from the basement, where these must pass through a store, than it is when they pass through another apartment where numerous partitions are available for concealing them. Frequently, also, the conductors are longer on account of the way in which they must be run.

For the same general reasons, it is more expensive to wire a store than to wire an apartment, even when open conduit is used for a portion of the work. Obviously, the additional cost is less when there is an open basement under the store to facilitate the work than when there is none.

Where certain apartments only are wired, and not the entire building, the human nature of the tenants of the adjoining apartments is often a matter to be reckoned with. If the whole building is being wired, it is impossible for any tenant to know whether the wireman's presence in his apartment is entirely for his benefit or not. If, however, the

second-floor apartment only is being wired, the tenant on the third floor has no doubt on this matter, and the contractor's force must often be diplomats as well as trained craftsmen.

Residences

The charges for service, meter connections and circuits for residences are given in Table I. To these must be added the proper charges for outlets in accordance with Table II.

Apartment Buildings

The charges for service, meter connections and circuits for apartment buildings are given in Table III, and the notes below it. To these must be added the charges for outlets in accordance with Table IV.

The prices given in Table IV, are based on wiring the entire building at one time. If this is not done the prices given in this table must be increased in accordance with Table V.

Table IV.

Outlet Prices for Apartment Buildings*

Schedule	Stories	Type of Building	Min. outlet per apt. not including switches	Living outlets	W.C. outlets	Bed-room outlets	Public stairs and pass. outlets
13	1	Open attic, no basement or unfinished basement	6	\$3.95	\$4.45	\$5.45	\$5.75
14	1	Open attic, finished rooms in basement	6	4.30	4.90	5.45	5.75
15	1	Flat roof, no basement or unfinished basement	6	4.30	4.90	5.45	5.75
16	1	Flat roof, finished rooms in basement	6	4.60	5.20	5.75	6.00
17	1½	With open basement	6	4.30	4.90	5.45	5.75
18	1	With open basement	6	4.60	5.20	5.75	6.00
19	2	Peak roof, no basement or finished basement	6	4.30	5.10	5.45	5.75
20	2	Peak roof, no basement or finished basement	6	4.60	5.40	5.75	6.00
21	2	Flat roof, open basement	6	4.60	5.40	5.75	6.00
22	2	Flat roof, no basement or finished basement	6	4.90	5.65	6.00	6.25
23	2	With finished rooms in basement	7	5.00	5.80	6.15	6.40
24	2½	With finished rooms in basement	7	5.00	5.80	6.15	6.40
25	3	Peak roof, open basement	7	4.90	5.65	6.00	6.25
26	3	Flat roof, open basement	7	5.00	5.80	6.15	6.40
27	3	Peak roof, no basement or finished basement	7	5.15	5.95	6.30	6.55
28	3	Flat roof, no basement or finished basement	7	5.00	5.75	6.10	6.35
29	4	With finished rooms in basement	7	5.55	6.35	6.60	6.85
30	4	With finished rooms in basement	7	5.55	6.35	6.60	6.85

Table V—Outlet Prices for Wiring One or More Apartments, But Not the Complete Building

Schedule	Description
31	For wiring first apartment in three or four-storey building, charge two-storey schedule plus 50 cents per outlet.
32	For wiring second apartment in three or four storey building, charge three-storey schedule plus 50 cents per outlet.
33	For wiring third apartment in four-storey building, charge four-storey schedule plus 50 cents per outlet.
34	For wiring top apartment in three-storey building, charge three-storey schedule plus 50 cents per outlet.
35	For wiring top apartment in four-storey building, charge four-storey schedule plus 35 cents per outlet.

Where wire guards are desired in any of the above cases, add 10 cents each. Duplex receptacles, add \$1 each.

Stores

Where apartment buildings include stores an additional charge of \$5 per circuit will be made for wiring the apartments over the stores. In wiring stores the following charges should be added to the regular schedule prices:

One and one-half storey building	\$11.50
Two to four storey building with basement	12.00
Two to four storey building, finished rooms or no basement	16.10

These prices cover wiring the store by using exposed conduit along the corner of the ceiling, and concealed arm-

Table I.

Prices of Service Entrances and Circuits for Residences

Type of building	Service with meter & first circuit (1 to 16 lights)	Second circuit (17 to 32 lights)	Each additional circuit (33 to 64 lights)
One Storey Building with Flat Roof...	\$13.20	\$6.90	\$3.85
All other residences	14.35	6.90	3.85

Table II.

Outlet Prices for Residences

Schedule No. stories	Type of Building	Description	Min. No. of outlets (not including switches)	Ceiling outlet	Wall outlet	Recessed outlet	Push switch and plate outlet	P. switch outlet	Push way switch outlet
1	1	Open attic, no basement, or unfinished basement	6	\$3.95	\$4.45	\$5.45	\$5.75	\$4.60	\$5.15
2	1	Open attic, finished rooms in basement	6	4.30	4.90	5.45	5.75	4.60	5.15
3	1	Flat roof, with or without basement	6	4.30	4.90	5.45	5.75	4.60	5.15
4	1½	With or without basement	6	4.30	4.90	5.45	5.75	4.60	5.15
5	2	Peak roof, open basement	7	4.30	5.30	5.45	5.75	5.15	5.50
6	2	Peak roof, no basement, or finished rooms in basement	7	4.60	5.60	5.75	6.00	5.15	5.50
7	2	Flat roof, open basement	7	4.90	5.85	5.75	5.75	5.15	5.50
8	2	Flat roof, no basement, or finished rooms in basement	7	5.15	6.15	6.00	6.60	5.15	5.50
9	2½	With open basement	7	4.60	5.60	5.75	6.00	5.15	5.50
10	2½	With no basement, or finished rooms in basement	7	5.00	6.00	6.15	6.45	5.15	5.50
11	3	Ordinary residence	8	6.00	7.00	7.45	6.60	6.30	6.25
12	4	Ordinary residence	10	6.30	7.30	7.45	6.60	6.30	6.25

Table III.

Prices of Service Entrances and Circuits for Apartment Buildings*

Type of building	Service with meter and first circuit	Each additional meter with first circuit	Additional for second circuit in apt. meter	Additional for each extra circuit in apt. meter
One storey, flat roof	\$13.20	\$4.10**	\$6.90	\$3.85
One storey, peak roof, or 1½ storey	14.35	4.10**	6.90	3.85
Two storey	17.25	4.10**	6.90	3.85
Two and one-half storey	17.25	4.20**	6.90	3.95
Three Storey	19.55	4.20**	6.90	3.95
Four storey	19.55	4.35**	6.90	4.10

*The prices listed for service entrances are for single buildings, or for double buildings not exceeding one and one-half stories. For double buildings of 2 stories or more, the prices for service entrances are 50% more than those given in the table.

**For each circuit having no switch, the price in the table will be increased by \$2.00 for two storey buildings, \$2.25 for 2½ or 3 storey buildings, and \$2.50 for 4 storey buildings.

***There is usually required one meter for each apartment in the building and one meter for public hallways, etc.

ored cable from this conduit to the various outlets. If it is desired to have all the wiring concealed, the price for meter connection (not including service), circuits and outlets for the store, will be 25 per cent greater than the corresponding figures in Tables III. and IV.

Garages

For wiring individual garages, and connecting them to the circuits and meters of residences or apartments, the price is made up of a charge for extending the circuit, a minimum price for wiring (which included certain outlets) and a charge per outlet, for additional outlets. The minimum charge for wiring is \$28.75, and this covers one drop cord, one wall receptacle and one switch, together with a 15 ft. extension cord. For additional outlets the charge is \$3 each.

Service Extension

Where service must be carried along the outside wall of a building the charge is 35 cents per conduit foot. Overhead lawn service between buildings, first 20 feet \$5.15 and 9 cents per foot additional work. The capacity covered by these prices is 100 lights or less.

	Wall and Drop Cord Used Instead of	Cord Sockets Where There are Fixtures			
		Drop Cord with Steel Box Cover	Drop Cord with Brass Canopy	Drop Cord on Gas Outlets	
With Key Socket, each	Wall Socket	\$1.05	\$1.40	\$1.50	
With Chain Pull Socket, each..	1.05	1.25	1.60	1.75	

Where wire guards are desired in any of the above cases, add 30 cents each. Duplex receptacles, add \$1 each.

It will be evident to anyone who has followed the matter thus far that this schedule is the result of study and experience. After deciding to prepare a schedule, the Commonwealth Edison Company, to secure correct data, had an inspection made of all house-wiring work completed during a period of three months. The data obtained cover the type of building, the construction and the complete wiring layout. Labor and material costs were analyzed on each job, and average costs were secured and listed with other jobs of like type. All work in progress was priced on piece-work basis as the job progressed. The totals were then segregated by class or type of building, and from the final results the present schedule was computed.

While a tremendous amount of time and effort was required in making up the original schedules, the work of adapting them to the wages, methods and other conditions of any particular locality should be comparatively simple, now that the way has been indicated. More equitable prices for the public, as well as more uniform profits for contractors, should result from the wider use of similar methods in every city.

Explanation of Wiring Schedule*

The price for wiring any residence or apartment building is made up of a charge for service entrance, meter connections and circuits, together with a charge for each outlet. These prices vary with the size and construction of the building as well as with the type of outlets, as indicated in the accompanying tables. Under certain circumstances there are various other items to be charged for, as indicated.

The prices cover wiring ready for the attachment of

*The prices in this schedule were used in Chicago prior to May 1, 1920. They cover rigid conduit for all wiring in basements and the use of armored cable for all other wiring. For service entrances the prices cover No. 14 wires and 1/2 inch conduit, where the current is 15 amperes or less, and larger sizes of wire and conduit, where necessary, to comply with the National Electrical Code requirements.

Where the current for a two-wire service would be more than 24 amperes, a three-wire service is used.

Service entrances are carried to the level of the ceiling of the second storey, for buildings of two or more stories, and to the highest point of the building, in the case of buildings of less than two stories, as required by the local city code.

The prices were based on a wage of \$1 per hour for wiremen and on the prices for material which were in effect at that time. Owing to an advance in wages, the actual prices used have since been increased. The general form of the schedule and the relation between the prices for the various items, however, have been retained.

fixtures, but they do not include any fixtures or other devices. These items should be covered by a separate contract. In certain cases, however, single sockets at each outlet, either hung by drop cords or mounted on the wall, are considered sufficient, and these may be included in the wiring contract at the prices given in Table VI.

The schedule prices apply to ordinary residences and apartment buildings of standard types, and cover a large proportion of all buildings likely to be met. Special cases, however, such as hotels, large apartment houses, high-grade residences or residences converted into apartments, should be estimated individually.

Where additional outlets are specified after the work of wiring has been started, the price for these outlets will be 10 per cent greater than the prices given in the tables. Where the number of outlets originally specified is reduced after the work is in progress, the credit allowed is 10 per cent. less than the prices given in the table.

Must Request Permission in Writing

The Toronto District of the Ontario Association of Electrical Contractors and Dealers have sent out the following notice, signed by J. A. McKay, secretary:—

Re Toronto Hydro-electric System Services Cut in Solid
 "The Toronto Hydro-electric System have brought to our attention the fact that they have been finding numbers of cases, where services are cut in solid and no authority has been given by the System for such to be done. All electrical contractors should realize this means the theft of current, which is a criminal offence, and that the responsibility rests between the workman and this employer.

"Of course, no member of this association would be guilty knowingly or wilfully of such practice, and this notice is sent to you so that you may in the future carefully guard against any workman in your employ committing the above offence.

"In case of emergency which should require the help of the System to give service without delay, your request for permission to cut in the service must be made in writing to the Chief Inspector, Toronto Hydro-Electric System, 226 Yonge St., or such request will not be considered."

Bad Habit of Newspapers to 'Blame Fires on Defective Wiring

The National Electric Light Association "Bulletin" contains an article in the April issue regarding the frequent practice of newspapers blaming fires, indiscriminately, on short circuits, defective wiring, etc., and cites the recent case of the New Orleans \$10,000,000 dock fire, which was reported to be caused by the "short circuiting of an electric wire near the surface of water that was covered with oil."

The Association appointed an engineer to investigate this matter and ascertain whether electricity was in any way responsible for the fire, and his report states, in part, that "a hot rivet dropped from a ship undergoing repairs into oil-coated debris on the water surface was the probable cause. As a matter of fact, there were no electric wires near the scene of this fire, the breakage of which could possibly have ignited the oil on the water surface."

It is very easy to credit defective electric wiring with many of the fires the causes of which are unknown, and very difficult to disprove the charge. It is all the more important, therefore, that definite cases of this kind where the charge has actually been disproved should be given publicity. It would also, doubtless, help the situation if electrical organizations everywhere would approach the non-technical press in a friendly way and urge them to use greater caution regarding their statements.

Wide Discrepancy in Contractors' Estimates

The contractors' problems seem to be the same the world over. The difficulty of estimating correctly is not confined to the Canadian business. Down in New York they have formed an estimators' association and the need for it is shown in the discrepancies in the estimates that various New York contractors submit in competition on the same job. The Electrical Contractor-Dealer publishes some interesting figures in a recent issue from which the following are taken.

Table I gives the "estimate" of four different contractors on the wiring of a frame building. The maximum variation was 19 per cent and though this is not as extreme a variation as is often noted in such competitions there is no contractor who will not say it is too much. In Table II., which is an analysis of the material and labor estimates, there is also a wide variation.

The problem of estimating correctly is plainly the stumbling block of the average contractor. How can it be solved?

The solution of this problem seems to depend upon the contractors getting together, comparing notes and educating themselves. There is no "School" to which they can go for instruction except the school of experience. Contractors must study their estimates together, compare differences, discuss errors in judgement, place actual costs (when the job is completed) beside estimated costs. This means work—hard mental work—but we do not believe there is any other

way to become a **real** contractor—the kind everybody wants to be.

And for the comparison of estimates it is absolutely essential that contractors standardize on their method of estimating. It is necessary that they have a standard estimate sheet. That is the conclusion the Toronto Electrical Contractors reached when they began to meet and compare prices and as a result they are now endeavoring to come to a decision upon a standard form. That is what the contractors in the United States found out also and which has resulted in the preparation of a standard form by the National Association of Electrical Contractors.

The preparation of a Standard Estimate Sheet to be used by all contractors is not as easy as it may appear at first thought. There are so many types of jobs, that it is very difficult to prepare a form that is suitable to all. And there are so many types of contractors, varying all the way from the big office with its well equipped clerical staff to the man

Table I—Cost Estimate of a Residence Alteration

Items	Est. A.	Est. B.	Est. C.	Est. D.	Average	Percent Variations
Material ..	1580	1603	1992	1990	1791	-11.0
Labor	821	825	1103	934	921	+19.0
Insurance ..	24			30		
Cartage ...	40			8		
Inspection ..	5					
Sundries ..	16	80				
Total	2486	2508	3095	2962	2763	+12.0

General Data:

Building—Frame, furred ceilings. Conduit—Black, concealed. Date Estimated—March, 1920. Scale—\$12.50 per day, man and helper.

Table II.—Analysis of Material and Labor

Material	Quantity of	Material				Unit Labor, Cost				Unit Labor per Day			
		A	B	C	D	A	B	C	D	A	B	C	D
Conduit	Light & Power												
	1/2"	3840	3400	3840	2900	.07	.07	.10	.06	180	180	125	210
	3/4"	360	380	90	160	.08	.08	.20	.07	156	156	62	180
	1"	260	600	270	250	.09	.10	.20	.08	140	125	62	156
	1 1/2"	30				.12				105			
Wire No. 14 Dx	2 1/2"	40	40	30	30	.21	.40	.20	.16 2-3	62	61	62	61
		4150	3850	4100	3750	.01	.011	.001	.011	1250	1175	1650	1125
	12s	220	250	270	205	.00	.00 4-5	.01	.01	1800	1800	1800	1250
	8	490	620	900	510	.01	.02	.01	.01	1750	625	1250	1250
	1/0	70				.02				625			
Boxes, ceiling side	4/0	140	130	100	100	.03	.04	.01	.03	410	278	1250	410
		37	34	35	32	.43	.60	.50		22	21	25	
		65	68	67	68	.42	.62	.50		30	30	25	
	sw. & rec.	82	95	94	95	.42	.58	.50		32	22	25	
	Switches, S. P.	32	33	11	11	.30	.44	.30	.30	42	28	40	40
Base Recept. Panels, Circuits Main Bd.	D. P.			22	22			.30	.30			60	41
	3 way	12	12	11	12	.50	.50	.30	.30	25	25	42	42
	4 way	1	1	1	1	.50	.50	.30	.30	25	25	42	42
		49	49	49	49	.45	.50	.30	.30	18	25	41	41
		56	46	56	56	.60	1.23	.62	.55	31	10	20	31
Low Tension Conduit		1	1	1	1	10.50	14.50	40.00	15.00	1.	.8	.3	.7
	1/2"			630	380			.10	.06			125	100
	3/4"			190	150			.13	.10			100	125
	1"			460	250			.14	.10			80	125
Wire, No. 18		3950	5000	7000	4050	.00	.00 3-5	.003	.001	2500	2080	200	2000
	8 pr.	220		300		.08		.05		150		100	
	10 pr.		240		187		.07		.07		115		115
		10	9	45	9	.40	.56	.54		31	22	22	115
		7	7	7	7	6.00	4.15	5.00	4.60	1	1	1	200
Outlets, boxes	Junct. boxes	5	6	8	6	4.50	4.80	5.00	3.50	1	1	1	100
	Potentiostat	1	1	1	1	12.50	14.00	25.00	15.00	1.	.8	1.	8
	Speaking tube		40	40	30	.20	.20	.30	.13	64	63	45	60
	Bells, 2 1/2"	4	3	6	4	.60	.1	.50	.50	21	10	11	11
	Buzzers	4	4	6	4	.60	.75	.50	.50	21	17	24	24
Pushes, Exterior floor extension midget		3	2	4	4	1.	2.	.50	.50	12	6	12	12
		1	1	1	1	1.	2.	1.	.50	12	6	12	12
		8	1	8	7	.50	2.	.50	.50	21	6	21	21
		21	24	22	9	.70	.82	.30	.40	18	14	42	40
		3	3	3	3	.45	.45	.63	.71	18	22	20	18

whose staff consists of himself alone; from the contractor with technical knowledge of accounting to the contractor of very limited education. It seems impossible to devise an Estimate Sheet that will serve the whole range.

The problem is a big one. It is the most important before electrical contractors today. It cannot be urged too strongly that every contractor should give the Toronto Committee their heartiest support. The value of a Standard Estimate Sheet, used throughout the industry cannot be overestimated.

Auxiliary Generating Plant at the Toronto Free Hospital for Consumptives

The principle of Safety First is demonstrated in a very practical manner by the Toronto Free Hospital for Consumptives at Weston, in their recent adoption of the "stand by" auxiliary generating plant, to supply electric power during "off periods" of the Hydro system, or in case of Hydro shortage. The authorities in that worthy institution have been seriously handicapped on many occasions in the past on account of no power to drive their motors or light their buildings. Mr. R. G. Lee, manager of the Industrial Engineering Company, proposed the idea of an emergency unit, which was accepted by the Hospital Board.

Continuous electric power is of great importance in that Institution on account of its heating system, and on account of the nature of the Institution itself. The boilers for steam distribution are heated by crude oil burners. These burners, as well as the supply oil pumps, are operated by

features of distribution are shown in the accompanying diagram.

The main switch and meter board consists of a single marble pannel 6 ft x 3 ft., on which are mounted main switches and cut-outs, field rheostats, ammeters and voltmeter, and an indicating light. To serve the 3-phase, 550 volt motors for laundry in extreme end of the same building, power is stepped up from 220 volts to 550 volts, by two transformers mounted on the wall in generating room. A double-throw motor-starter type switch is installed where Hydro service enters, by means of which the motor feeders can be readily thrown over from Hydro to local plant, or vice versa. Each individual motor is equipped with the ordinary starting control.

To supply power to the various single phase, 220 volt oil burner motors, as previously mentioned, considerable wiring was necessary. No. 1 Division shows wiring from switch-board to burner in the same building, with a double-throw switch, to run motor either from Hydro or generator. To supply the two other main buildings a single line of No. 8 w.p. wire was run from outside the Queen Mary Building about 2,000 feet long. By courtesy of the Hydro-electric system this wire was run on their poles, and the Hydro grounded neutral used for the second wire, one leg of the generator also being grounded. This system effected considerable economy. No. 2 Division shows branch feeders to double control switch in Nurses' Home, similar to No. 1. Division 3 and 4 show branch feeders to banks of motors in the King Edward Sanitarium, with similar double-throw switches. Each motor has its individual switch, cut-outs, and starting rheostat. With the system completed, it is demonstrated that the oil engine can be started up, and motors supplied from auxiliary generator in about five minutes.

The complete installation, machinery and control apparatus, was carried out by A. G. McLeish, Electrical Engineer and Contractor, 159 Pacific Ave., Toronto.

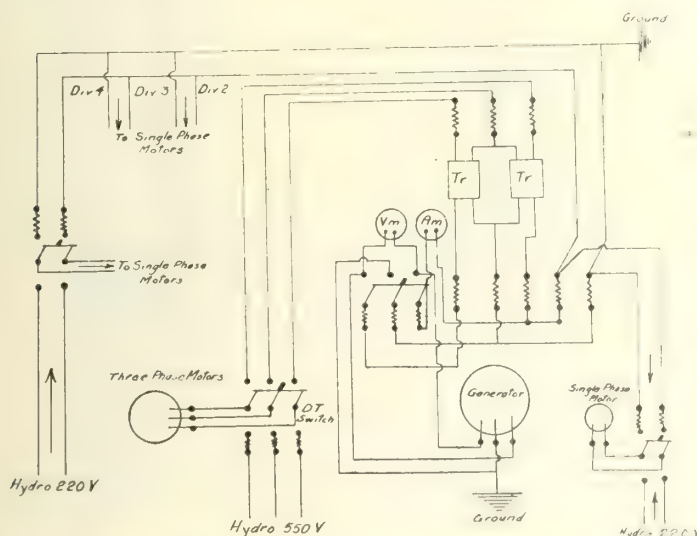
Organizing Branch for Windsor District

The electrical contractors of the Windsor district are considering the advisability of organizing a district Association and will, presumably, join up with the Ontario Association. This is good news. What we need is a couple of dozen of good live district organizations covering the province. The machinery is all ready, for the Ontario Association has a charter with power to establish district Associations. It would help a lot to get the wheels of industry going again if the contractor-dealers were properly organized.

Installing Furnaces in Canada

The Electric Furnace Company, Alliance, Ohio, has just installed three Bailly electric brass melting furnaces of different size and capacity but built upon the same resistance principle. The Bagley & Sewall Company, Watertown, N.Y., has installed a 50 kw. electric furnace with 500 pounds hearth capacity; the Alliance Brass and Bronze Company a 75 kw. furnace with 800 pounds capacity; and the Empire Brass Works of London, Ont., a 105 kw. furnace of 1,500 pounds hearth capacity. All of these furnaces are to melt yellow and red brass alloys. The Empire Brass Works is the fourth Canadian plant to adopt the Bailly electric furnace for melting its non-ferrous metals.

Harry Hicks Company, 203 Church St., Toronto, has been awarded the contract by the York County Commissioners for electric light fittings for the County Building.



Wiring diagram of electrical equipment.

electric motors. Hence in cold weather the shutting down of motors is followed by a lowering of temperature in the wards. The great amount of laundry turned in every day could not be taken care of with the washing machines off. The installation of an emergency generating plant during the past winter will, it is believed, take care of all these requirements.

The generating outfit consists of a 50 kw., 220 volt, 3-phase, 25 cycle generator, belted to a 3 kw., 125 volt exciter, the prime mover being a Brantford Oil Engine, Diesel type, belted to generator, supplied by the Industrial Engineering Co., 28 Wellington St. W., Toronto. These are installed in a separate room in the Queen Mary Building. The main

BETTER MERCHANDISING

The Art and Practice of Illuminating Engineering

Single Light Standard Good Practice for Streets—Economical Method of Policing—Maintenance Often Neglected

By LIEUT. M. B. HASTINGS*
Engineer, A. H. Winter-Joyner, Ltd.

The art and practice of illuminating engineering, changes more, and at more frequent intervals, than most of the other engineering branches.

The "Open Arc" was probably the first in common use, and held the premier position for many years. Then came the "Enclosed Arc," followed by the "Flaming Arc," all of which were regular saw-mills for machinery and parts. The "Luminous Arc" is the only mechanical lamp surviving. I well remember selling a Flaming Arc System to the U. of T. to light their skating rink. There were four lamps in series across 220 volts d.c. I was so disgusted with their performance that I visited the rink almost every night to adjust them, and keep the installation satisfactory to my customer. So much for the old Arcs; forgetting their troubles mechanically we have not surpassed them yet in actual w.p.c.—and it may be, but hardly likely, that the mechanical lamp will return later in the cycle of invention.

A few years ago the whole question of street lighting was usually dismissed, after a few minutes' consideration, by deciding to place a lamp here and there, or sometimes, the town expert would have one lamp at each corner. It is amusing to recall the $\frac{1}{2}$ in. goose neck brackets with the metal hood painted white to increase its efficiency. In a very short time the paint peeled off and hung in shreds, while the metal behind it rusted away. Now, the smallest community insists on an adequate modern system, a decision being invariably made in favor of a substantial, well designed and efficient unit. That interest is what convinces me more each day that street lighting is important, is necessary, and of vital concern to the community.

We all admire beautiful and well kept streets, and nothing sets off a street better than a pleasing, and smart street lighting system. The neglect of this is a reflection on the community, just as a shabby suit is a reflection on the one wearing it.

Light and Illumination

It was Mr. O. L. Johnson, field representative of the department of lighting of the N. E. L. A., who recently emphasized the difference between "light" and "illumination," by describing **Light as the cause, and Illumination the effect.** We have light (either natural or artificial), and it is our business by means of certain principles to control it properly.

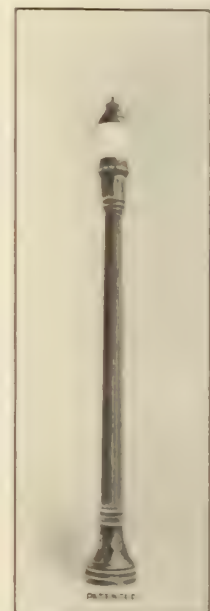
It is very seldom proper to accept a layman's verdict as to the merits or demerits of a lighting system. For example, the untrained eye often mistakes glare for good street lighting; it simply does not detect incorrect lighting, but involuntarily tries to overcome it. The effect of bad lighting as evidenced

by eyestrain is not noticeable for a considerable time; in fact, invariably will the fatigue be blamed on something else. Many articles have been written on industrial lighting, showing the effect of eye-strain very clearly, and I believe it is fair to say that the same applies to street lighting. All of us can recall the very high intensity units which used to hang in front of moving picture houses. Many can be seen yet in U. S. cities. They simply blinded the passers-by. It was actually criminal to allow, by law, such an injustice to the public. Yet, as I said before, the average eye involuntarily tried to overcome this. It is, therefore, our duty as engineers who understand the fundamental principles, to guide, rather than be influenced by the wishes of those whose ideas are not based on the solid foundation of fact.

In street lighting, we have many things to contend with, which are not met in industrial lighting. For instance, the



Typical White-Way standard.



Semi White-Way for side streets.

automobile is a serious menace to the public safety if not properly regulated. The vehicle must be properly lighted, by law, but that does not mean glaring head lights. Glaring head lights can defeat the efforts of the best street lighting engineer in the world. It is, therefore, gratifying that public opinion has caused an effective crusade against that menace.

Now, let us consider several different classes into which street lighting may be divided, viz.: (1) White Way, (2) Semi-White Way, (3) Residential, (4) Park and Boulevard Lighting.

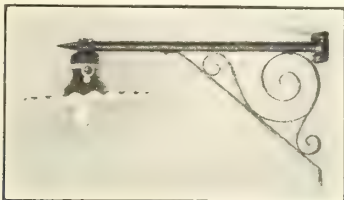
White Way Lighting

The low intensity five light filaments, as used in many cities, are speedily being superseded by the high intensity nitrogen-filled tungstens. It almost looked as if the glass manufacturer had control of the street lighting in those days. They were inefficient and costly, but it must be admitted that the average citizen thinks them ornamental. It must be remembered that there were no gas-filled lamps and no magnetite arcs at that time.

Single light standards with 1000 c.p. nitrogen-filled lamps

*Before Montreal Section F.I.C.

placed 14 ft. 6 in. above the pavement, and poles about 90 ft. apart on both sides of a 66 ft. street, is considered good lighting. If a pendant type of unit with a proper reflector and globe is used, the spacing can be slightly greater, and the height increased to say 16 ft. In San Francisco, Los Angeles, Salt Lake City and other cities, they have introduced what they call "Intensive White Way Lighting," or the "Path of Gold." It simply consists of three units, like our White Way systems, mounted on one standard, of course, take special precaution to mount them above the angle of vision, hence there is no glare and the high intensity



A popular and efficient unit.

desired on the pavement is effected. This intensive system makes the streets like day, increases the visibility, and makes motor traffic almost free from accompanying accidents.

I referred a moment ago to a height of 14 ft. 6 in. and 16 ft. as good White Way lighting. I used those figures advisedly, and I wish to make clear that I recommend them for the average Canadian town and city because "as yet" we do not possess buildings and elaborate drive-ways like some of the larger cities in U. S. and Europe. I mention this to show that occasionally local conditions demand very high standards, e.g., it is often very advisable and desirable to carry the light up to the sky-lines of artistic buildings with good illumination on the cornices, so that for this reason if no other, intensive lamps should be placed 25 to 30 ft. above the sidewalk level. Further, the high candle power units must be kept above the show windows, so as not to interfere with the window display. The units recommended for 14 ft. 6 in. and 16 ft. heights are not intense enough to interfere with window display.

Care should be taken not to allow a sudden change from brightness to relative darkness, either in passing from a



White way lighting in Chatham, Ont.

busy main street to a side street, or vice versa. Therefore, on streets leading off the main street the first lamp on both sides should be stronger than the others. The eye will accommodate itself quickly to the new condition, but it is a Safety First measure to assist it.

Now let us consider the next heading under which we are reviewing street lighting.

Semi-White Way

This class of lighting is used to taper off a White Way section, and is located on parts of the main thoroughfares where the traffic thins out. The design should be a continuation of that adopted for the White Way. The height to the light-centre should be about 12 ft. if the White Way is 14 ft. 6 in. If pendant units are used the height should be

about 14 ft. 6 in. if the White Way is 16 ft. The size of lamp should be 600 c.p. if the White Way is 1000 c.p., and 400 c.p. if the White Way is 600 c.p. The section of street illuminated by this unit usually has a different class of buildings, the second storey of which is often used as apartments. The standard, therefore, must not be high enough to interfere with the tenants' comfort or sleep. This unit is also used to advantage on the main streets of towns.

Residential

The residential section of a community presents many problems. This section of towns and cities varies greatly. Some have many shade trees, others have not. Some have paved roads, others have not. Some have narrow roads and beautiful lawns, others the reverse. It therefore follows that local conditions play a very important part.

Ornamental brackets mounted on wooden poles are usually the most efficient form of unit. The bracket should project about four feet and have a high efficiency radial



The "latest" for parks and boulevards.

wave reflector. The lamps should be bowl-frosted, 150 c.p. at corners and bowl-frosted 100 c.p. between. There should be a bracket on every pole at least, while the outskirts of the community in the more thinly peopled area could do with a unit on every second pole.

Before leaving the residential lighting, I may say that the class of poles used in the distribution system largely determines the design of bracket which should be chosen. In erecting brackets in the residential section, care should be taken to preserve a fairly uniform line and not follow the contour of the road too closely. This means that the height along the same street will vary probably from 12 to 16 ft. When laying out pole lines for a general distribution system, more attention should be given to their utility for street lighting. When poles are placed at street intersections, some care should be taken to place them where they will most suitably carry a lamp. If this is not feasible, then an extra pole is justified to place the lighting unit where it will best serve its purpose. In many cases where, in general, lamps are being located on every second pole, we find a block with three spans between intersecting streets. If the spans

had been shortened and an extra one put in, there would have been a suitable location in the centre of the block, but as it stands the chances are that the block is left dark.

Park and Boulevard Lighting

Park lighting usually receives too little consideration, but it is very important and by far the most economical way of policing. Boulevard lighting is usually ornamental and underground. The 12 ft. pillar for Semi-White-Way lighting is best adapted for this class of lighting. Sometimes a 10 ft. 6 in. pillar is used on account of the shade trees. In some elaborate boulevards, with green strips and flower beds in the centre and a drive-way on each side, very tall standards as high as 16 ft. are used. There are a very few cases—none in Canada I know of—where the standards are as high as 18 ft. This class of lighting is usually done on the local improvement plan.

Maintenance

With few exceptions systems are not properly maintained. It is sheer waste of money to install a good system of street lighting, and allow the reflectors to become covered with cobwebs and dust, and globes to become the last resting place of thousands of insects.

Many times I have returned to a town and found smaller lamps replacing the original size. The conditions had not changed, so why was the false economy permitted? Too small lamps in globes makes them appear very sickly and has a dampening effect on peoples' dispositions. The lamp must be large enough to make the globe look pleased with itself and as if it enjoyed performing its duty:

In series systems one film in the film socket is enough. Don't allow anyone to get the impression that if one is good, two are better. Train the patrol-men to give the fixture the once-over every time they change a lamp.

Don't let lamps stay in the socket till they are black. Tests have shown 100 c.p. multiple lamps taken out of service which only measured 22 c.p. This condition is neither economical or fair to the public, and it is a temptation apparently few managers can withstand. Keep in mind what the public is actually paying for and see that they get it. Paint the units regularly, and clean the reflectors and globes more frequently.

Cost

The difference in cost between rigid units and cheap ones is very small when you consider the cost of the units connected to the feed wires; and when you consider the interest, sinking fund and depreciation charges on the difference in cost there ceases to be a single argument in favor of anything but the best.

In conclusion, I will quote an authority who expressed himself as follows:—

"A city is judged by impressions. It may have the finest climate in the world; it may be fortunately situated near rivers and railways; it may have every natural advantage that a business man may desire; yet if it be unattractive, dirty and gloomy, its development will be slow. When it does develop, the first impetus will be given by changing its appearance for the better; and in that change street lighting will play an important part."

Gentlemen, in all sections of this continent, the people are awakening to the advantages of proper street illumination. Central stations, business men's associations, publicity clubs and the citizens at large are uniting in a common effort to boost their "home town" by the proper lighting of the streets.

The 44th Convention of the National Electric Light Association will be held in Chicago May 31st to June 3rd. Headquarters: the Drake Hotel.

Manitoba Electrical Association Hold a Successful Banquet—Winnipeg Bowling Teams Presented with Prizes—100 Members Present

On Thursday, the 14th of April, the members of the Manitoba Electrical Association held a very successful bowling tournament at the Saratoga Bowling Hall, there being about 85 members playing. The winning team composed of members of the Association were:

R. L. Baker, Burgess Battery Co., Captain.
H. O. Russell, Great West Electric Company.
W. S. Raymond, Electric Motor Co Ltd.
H. J. Franklin, Canadian Fairbanks Co.
D. R. Harvey, Northern Electric Co. Ltd.
E. H. Polden, McDonald-Willson Co., and
F. H. Patterson, Canadian General Electric.
The winners of the consolation were:
A. E. Stunden, Great West Electric Co., Captain.
O. L. Boyd, Winnipeg Engineering Co.
T. W. Price, Electrical Contractor.
F. C. Carman, Burgess Batteries Ltd.
M. A. Deering, Northern Electric Co.
W. F. Towers, Winnipeg Hydro. and
A. H. Steventon, Otis Fenson Elevator Co.

At 8.30, the bowlers with a few additional members of the Association adjourned to the Fort Garry hotel where they held a banquet. Fred Pratt, president of the Association, presided. It gave him great pleasure, he said, to accept on behalf of the Association, the cup given by J. Gordon Smith, general manager of the Great West Electric Company, the cup being presented to the Association by F. C. Roberts in Mr. Smith's absence. The president expressed the hope that the Association would be able to enter a team in the Commercial League.

Musical numbers were contributed by Miss May Clark and Art. McFayden, of the Standard Underground Cable Company. Harry Allen, of the Great West Electric Company, recited "The Shooting of Dan McGruce," in a very able manner. H. G. Stephenson, of Cochran & Stephenson, and H. Reid, of the Great West Electric, were the masters for the evening.

Individual prizes were presented to the lucky winners by M. A. Deering. Fred Pratt presented the Great West Electric cup to Mr. Baker, captain of the winning team.

During the evening a number of popular songs were thrown upon a slide operated by Mr. Milne, in which the whole assembly exhibited their vocal talents. A most enjoyable evening came to a close with the singing of the National Anthem.

"Say It Electrically—Flowers Die"

For a long time now the public has been persistently entreated to "Say it with flowers." The phrase has been so prominently displayed that it has become thoroughly familiar to most people.

The man who sells electrical appliances can profit from the extensive advertising of this phrase by adapting a variation thereof to his own business. It is suggested that the heading of this article, "Say It Electrically—Flowers Die," constitutes a slogan that might be used effectively.

The man in the street is first attracted by the similarity of the slogan to the other well known phrase; inevitably, however, the idea of an electrical appliance as a source of lasting pleasure suggests itself to him; moreover, the slogan emphasizes the fact that electrical appliances make acceptable gifts and that they are things of beauty and enduring satisfaction.

The Merchandising of Electrical Appliances

By L. H. TREADWELL*

The only kind of merchandising in which you are interested is successful merchandising, and the foundation of successful merchandising consists first in creating confidence and second in keeping the confidence created. You must make people believe in you.

In the early days selling a vacuum cleaner or washing machine to the housewife could be compared to-day with trying to interest a business man in the purchase of a commercial aeroplane for his every day use. He may believe that it is a coming thing, and so a home keeper believed that in order to save labor in her home—some day—she would need an electrical cleaner and washer. However, the salesman had to overcome the lack of belief on the part of the housewife that it was for her just then.

The price was usually prohibitive, to her mind, for she failed to figure anything but the first cost. This, of course, was not true of everyone, but where these conditions were not met there was prejudice against anything electrical, first from a lack of real information about electricity or its application to appliances, and second for fear that because they were electrical the goods would not stand up. The last obstacle was one big reason why manufacturers were forced to issue written guarantees for from one to five years with every sale. These same guarantees have given the dealers a great amount of unnecessary trouble.

Creating a Desire

A great deal of my own early experience with vacuum cleaners was direct with the customers in their homes where their confidence was gained and the prejudices overcome by leaving the machine on an absolutely free trial for a few days. The fact that a salesman was willing to leave a vacuum cleaner on its merits for a woman to use, inspired confidence in the salesman and in the article itself, for few men would be willing to leave an article in a home unless they felt pretty sure it would do what they claimed for it. Leaving the machine also created a desire on the part of the prospect to own the article, for if she used it, as was intended, she could not help but compare the ease of electrical cleaning with the old hard, dusty way, and scheme some way or other to get it.

Then if you could make the terms easy enough for her the sale was usually made, provided the man of the house was willing. Many the time I have had to spend a much longer time convincing a man who thought anything was good enough for his wife to use and thought she had very little to do, before closing a sale, than it took to make all the preliminary steps in selling his good wife.

Present day conditions, however, are far different, as various factors have entered into the sales problem of the electrical specialty man. The world war with its resultant unrest and female labor shortage has forcibly brought home to housekeepers that they must rely on electrical servants rather than on the undependable human ones. To this factor has been added the cumulative results of education in and experience with electrical appliances. Homekeepers have gradually been educated to the use of and to the belief in their dependability.

It used to be much easier to sell the middle aged woman a vacuum cleaner than a young married one, but now the younger ones have grown up with a fixed idea in their minds that modern electrical conveniences are their natural birth-right and of necessity a part of their household equipment.

Very little effort is needed to-day in overcoming prejudice, but rather the effort has to be placed on convincing your prospect that the particular make of appliance which you are selling is the best for their purpose.

Confidence is built very gradually like credit and you create it in the minds of many by keeping confidence alive in the minds of the few with whom you first do business. How then can we make sure that we keep the confidence of the buying public and thus increase our sales? First, we must make a very careful selection of the goods which we wish to merchandise; they must measure up to the standard which we set for our stores. Second, we must make a most careful selection of our salesmen. Good will is often lost by an unscrupulous or tactless salesman.

Much is demanded of a man who represents you on the outside. His personality, appearance, habits and integrity are large factors in both his success and the success of the house which he represents. Over anxious salesmen often do more harm than good, for they are prone to make too many promises to their customers. They often exaggerate as to what they will do for a customer provided they purchase from them, and then speedily forget that the customer ever existed.

It is not always the man who brings in the most sales who is your biggest asset. It is rather the fellow who makes the most sales that really stay sold; the fellow who takes the time and pains to show his customer how to get the most out of her appliance and who carefully instructs her as to the oiling, care, etc.

Should be Trained

Salesmen need a considerable amount of very careful training. They should be drilled thoroughly as to how to tactfully approach a customer, how to hold their attention, how to create desire, and how to present the sales plan to them in such a way that the sale can be closed. The salesman must be warned, however, that his sale is never made unless he has taken time to go into all the necessary details relative to getting the best out of the machine and keeping it in first class condition.

Our customers must be taken care of if we are to keep their confidence, but I believe that the electrical industry as a whole, and I feel fully as much to blame as anyone else, has educated the public to expect altogether too much in the way of service in the purchase of electrical appliances. We have been over anxious to make sales and as a consequence have made for ourselves an infinite amount of service which we were bound on honor to give to our customers.

There is no other industry to my knowledge where as much is expected of the electrical specialty concerns. The average woman, of course, is not mechanical and very often a salesman does not explain fully to her just what she must do in order to get the best out of her appliance, and even though he does, she is liable to forget in a half hour all he told her.

As a consequence, in the case of a vacuum cleaner, for instance, if it has no suction she will immediately call up the dealer from whom she purchased it and present her tale of woe. Ninety times out of a hundred the dust bag will be so full of dirt that it will be impossible for the air to pass through it, and yet she would not think you were justified in making her a charge for emptying said dust bag.

Is Too Expensive

This example in various other forms is a daily occurrence with any large dealer in cleaners and washers. We have created a large number of cleaners and this has cost us all a goodly sum. The average woman will not do any mechanical thinking for herself if she can use the telephone and secure the necessary help.

Comparing sales made in the outlying districts with those

*At a recent Worcester, Mass., Electrical Convention.

made in town, we find that only a very small proportion of trouble calls come from the outlying districts. The people there are more dependent upon themselves and therefore they do a little thinking, use a little ingenuity and determine for themselves just what their trouble is.

I do not mean to say that goods should not be guaranteed; or that dealers should not live up to these guarantees; but there is a large amount of service which rightfully does not come under a guarantee, but which we are forced to give in order to keep the good will of our customers. I believe a fixed policy on the part of this association should be formulated and lived up to; a policy which would be fair to both the customer and the dealer.

Take the case of an automobile that comes under a guarantee. None of us expect the automobile repairman to do his work for nothing. No more should the electrical dealer be forced to run to a woman's home on Monday morning and replace fuse plugs just because the operator of an electrical washer tried to run a bunch of clothes through the wringer, without using any judgement whatsoever in the matter.

Have you ever had a customer call you up and tell you her washer would not run and find out that she had forgotten to turn on the switch or that she had carelessly dropped the connecting plug and broken it; or that the connecting cord had been cut because of carelessness in rolling the machine about the floor? Possibly you fixed these little things for her and made a charge as you had a right to do, and then had your customer come back and ask if the machine was not guaranteed.

Most people's conception of a guarantee has been and is that the article so guaranteed will be kept in running order for a year free of charge regardless. Lots of little things can go wrong, due either to lax inspection on the part of the manufacturers or more often carelessness on the part of the operator that entails a great amount of service, and that service we are expected to give gratis.

To Solve The Problem

I firmly believe that the following, or a similar policy, strictly adhered to would solve the problem: Furnish absolute free service for ninety days and after the expiration of that period replace free of charge any part of a guaranteed machine proving defective within the guaranteed period, but making a regular service charge of \$1.50 per hour for the time necessary to replace the parts and add a charge for calling for and delivering, no matter what the article may be.

This policy should be advertised and then the public would gradually come to rely more on themselves and less on the dealer. If we are to be successful merchandisers we must either make this service charge or less secure from the manufacturer enough extra margin to take care of this heavy large item.

This brings us right down to the matter of discounts which said manufacturers, particularly of washing machines, are allowing the dealers. In talking with the manager of an electrical store in a nearby city, he stated that their profit on a washing machine that retails at \$175.00 was just \$3.50 and their service charge was \$2.50 per machine afterwards. Do you wonder that this concern is not enthusiastic about selling washing machines?

Just as long as washers sell readily they will handle them, but when any great amount of effort has to be put into the sale of them they will be relegated to the rear of the stores. All because the discounts allowed by the manufacturers are not great enough to allow them a reasonable profit.

The Crouse-Hinds Company of Canada, Toronto, are distributing further copies of Bulletin 1-D describing Safety Panels and Cabinets. This is supplementary to Bulletin No. 1, issued previously, and is well illustrated.

Winnipeg Electrical Dealers Find It Pays to Advertise

Those engaged in the electrical industry will be interested in the efforts which the Manitoba Electrical Association is making in order to obtain the maximum publicity for the industry. A short time ago W. L. Goodwin visited Winnipeg and delivered his enlightening message on co-operation. He also gave the members of the association some good advice on publicity. Starting from this point the Manitoba Electrical Association appointed a Publicity Committee to carry out the ideas expressed by Mr. Goodwin and which had been held by a number of the members of the association for some time.

The Publicity Committee decided to run a page of advertising dealing with electricity and electrical appliances in the most widely circulated newspaper in Winnipeg. There are 2,400 lines to a page and the advertising carried each week on this page aggregates in the neighborhood of 2,000 lines. The balance of the space is devoted to news articles dealing with electricity and its methods of application through the various appliances.

The effect of this page has stimulated great interest in the electrical industry throughout the city and the various dealers advertising, credit this new departure with having increased their sales.

This electrical page is made to stand out very effectively through the newspapers placing a heavy display line right across the top of the page, reading "Modern Electrical Appliances Make Home Life More Enjoyable." The electrical matter on the page is prepared by the Publicity Committee, which comprises A. Stunden with the Great West Electric Company; W. T. King, City Light & Power; H. C. Howard, Winnipeg Electric Railway Company; and E. H. Chapman, "Electrical News."

Why Don't We Boost Our Business?

Chicago has just held an "Own Your Home" Exposition at which a "Home Electric" was the principal feature.

Kansas City held a National Exhibition of electrical appliances and apparatus April 18 to 23.

It has just been announced that the New York Electrical Exposition will be held during the ten days beginning Sept. 28.

Announcements of this nature appear almost daily in the U. S. technical press.

When and where are we going to hold some Canadian Electrical Exhibitions?

Boosting With Big Sign

452 Bloor St. West, Toronto

Editor Electrical News:

I have noticed your boosting of the slogan, "**Buy Your Electrical Goods at an Electrical Shop,**" and we think that you are following a splendid course in so doing. We feel that the electrical trade in general should voice a vote of thanks to the Society for Electrical Development for creating the above slogan, and would suggest that it would be a good idea if window cards were permanently displayed bearing this slogan.

We have gone a step farther and have had an outside sign of about 6'x4' made, which makes a splendid sign, in-as-much, as to the eye of the public the words Electrical Goods and Electrical Shop are very prominent.

You are at liberty to use this letter in furthering the use of the symbol that would be beneficial to all.

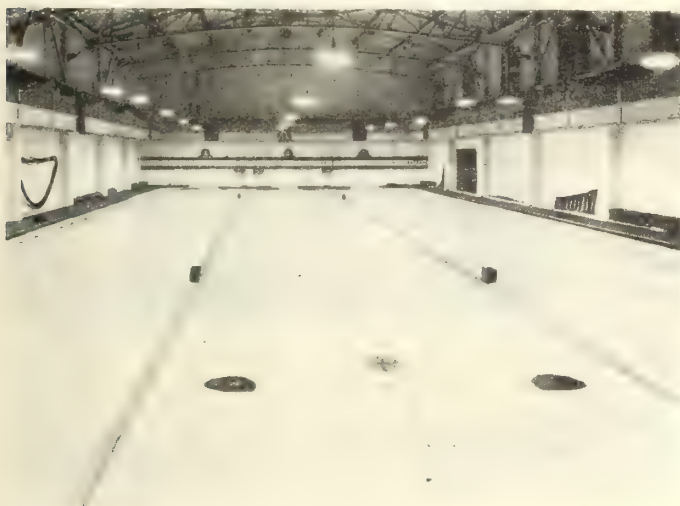
Yours very truly,

Toronto Electric Contracting Co.

J. A. D. Gossens

Good Lighting for St. Andrew's Curling Club, Montreal

We illustrate a lighting installation just installed by the Northern Electric Co., at the St. Andrew's Curling Club, St. Matthew Street, Montreal. It will be seen by the photograph that the building has accommodation for three rinks and the importance of a satisfactory lighting system will be appreciated by any of our readers who are followers of the "roarin' game." When the Northern Electric Co. was consulted as to the best system to be installed, two alternatives were presented—one, flood lighting and the other by R. L. M. reflectors. After considering the merits of both of them, it was decided to install the latter, the object being to give



Fifteen foot-candles and no shadows.

even lighting with the absence of shadow and giving approximately 15 ft. candle power. This is accomplished by reflectors of Benjamin manufacture; the lighting has a spacing with a 17 ft. centre and a mounted height of 15 ft. from the ice surface. Each rink has a 200 watt bowl frosted nitrogen lamp at each end, and five 150 watt shallow bowl lamps between, making a total of 21 lamps. It has been found that the lamps for each rink give sufficient light to enable play to be carried on without using all or part of the installation for the adjoining rink. Mr. R. S. Muir, Montreal, electrical contractor, carried out the work of installation.

Seattle Store Has Novel Show

By J. B. MILES in Contact.

Probably the most unique and profitable "Electrical Show" ever "put on" by any retail establishment was the one held by Frederick & Nelson, Seattle, in the auditorium, on the fifth floor of this luxurious department store. The display was not only profitable for this firm, but for every electrical appliance store and department in the city, because the articles were not only artistically displayed and freely demonstrated in individual booths, but also because neither the demonstrators, nor any one else did any soliciting.

When one desired to purchase an electric washer, stove or iron after a demonstration, he or she would be referred to the "Information Desk" where the party would be told in what section of the store that particular article could be purchased. This idea pleased those who came to see the demonstrations, for while many did not desire to buy, at that time, the manner in which the big store treated them,

made friends of the 5,000 who visited the auditorium during the six days of "Electrical Week."

Twelve leading manufacturers accepted the invitation to show their appliances in the "Electrical Show." They brought their products and arranged them tastefully in booths provided for them in the auditorium. Over each booth, the trade mark name of the articles demonstrated inside, was inscribed.

Every electrical appliance and article that could be used in the house, about fifty in all, was shown and demonstrated. Among these were electrical ovens, percolators, grills, sewing machines, fans, ironing machines, irons, ranges, vacuum cleaners, dish washers, vibrators, curling irons and fireplaces.

The public was made to realize that this was not a "selling" show but purely educational. This was emphasized in a talk twice a day, 11.00 a.m. and 3.00 p.m., on "Keeping Your House Electrically." After, and in many cases during the electrical talk, the articles were demonstrated on request, but no one was asked to buy.

The "Information Desk," previously referred to, was conducted by the City of Seattle's Lighting Department and the Puget Sound Electric Co. Their representatives furnished the exact cost of installing ovens and ranges, and gave the cost of operating these; the approximate amount of current needed for washers, vacuum cleaners, etc., and any other questions anyone interested desired to know. No names or addresses of these who came to the information desks were taken. When the customer desired, she would be told whether or not it would be possible to obtain the necessary current in the locality in which she lived, or if it would be necessary to bring the current from another locality. Those at the desks were surprised at the number who were interested in this "Electrical Show," and the demonstrators were surprised at the number who had never heard of or seen, prior to the exhibition, any of the electrical goods that were shown. One woman had never seen a percolator, although she had heard of one. Another had never heard of or seen an electric mangle or electric fireplace, and she has always lived in large cities. Instances of this character prove the value of holding electrical displays, held and conducted in the manner described in this article.

On the auditorium stage, under a strong light and in a beautiful frame, stood a girl dressed as a bride. An arch over the stage was entirely decorated with white blossoms and white flowers, as was the edge of the stage. On the stage in front of this "Electrical Bride," as some called the girl, were many electrical articles, such as washers, percolators, irons, ovens, ranges, candle sticks and candles, etc. These articles suggested to the many who were interested in this very novel display that a bride should be given things electrical, for these articles save her energy, time and money.

New "Cora" Units for Commercial Lighting

Several new units, particularly adapted for commercial lighting, have been developed by the Consolidated Lamp & Glass Company of Coraopolis, Pa. These new units are of Cora, a snow-white cased glass, possessing remarkable lighting efficiency. Cora Glass, besides its lighting efficiency, has the qualities of thoroughly diffusing the light rays, and of perfectly concealing the filament, yet it has a glazed, not a rough, surface. To obtain these qualities, about four-fifths of the thickness of the glass is of crystal, and the lining, about one-fifth, is of white glass. The Consolidated Lamp & Glass Company are ready at all times to make special recommendations in regard to obtaining the best lighting results in office buildings, schools, churches, hotels and other types of buildings. In this respect, the long experience of this company, extending over a quarter of a century in the lighting world, should prove of most practical value.

Who Said Depression?

(By Special Correspondent)

Mirth and melody flooded the ambient evening air at Stanley Hall, Montreal, on the night of April 21st, for, shades of Lew Dockstader, weren't those Northern Electric Minstrels holding forth in a gala performance?

With a cast composed entirely of local Northern Electric talent, an entertainment of unusual versatility—ranging from step-dancing to mind-reading—and packed with good things in song and patter, was presented to the delight of a capacity house.

The principals were headed by Interlocuter F. William Johnson, little pal of the Dominion Statistician, with Big-Bill Carter, Evans, Hay and Grimwood as end-men, and E. G. Lee, J. O. Beaudet, A. Barber, A. Wilson, W. E. Smith, A. Denson and the Misses Cramer, Davidson, Field and Rohrlisch as soloists.

Ten dainty damsels whose silver-toned warbling blended harmoniously with the more robust notes of ten male voices, comprised the chorus. Roll dem bones, oh baby talk to papa, but dat was some chorus! Hand-picked and trained by so famed a connoisseur of beauty as Eddie Layton, there is little wonder that it rated A-1 with the musical critics of Baldhead Row.

Fun was fast and furious from the outset; the hard-working Bill Carter's elephantine playfulness putting the crowd in good humor and keeping it there in a way that set more than one maiden lady of uncertain age to sighing over a mis-spent life.

Interspersed were musical numbers, outstanding among which was a really artistic rendering of "Whispering Hope,"



Mr. E. H. Layton, Musical Director.

by Miss Cramer and Mr. Lee. Very pleasing harmony was also produced by the Northern Electric quartette—Wilson, Beaudet, Lee and Smith—while timely reference to M. K. Pike's vigorous, but vain, attempts to find holes on a certain golf course and C. F. R. Jones' pathetic pilgrim's progress with a corkscrew in Toronto, were received with gusto.

Another unique feature was an exhibition of burlesque mind reading staged by Will Simms, with the able assistance of Miss Florence Pirrie, who added to the merriment by trying to vamp Bill Carter. The susceptible old thing nearly fell for it till Bill Johnson's cool, calculating, statistical mind intervened. Simms and the little lady, with Jimmy Gill

disguised by a hair part, also gave an interesting conjuring act.

It was a most satisfying show and one that speaks volumes for the esprit de corps that exists among the Northern Electric employees from officials to office boys, for all



Mr. F. W. Johnson whose recent efforts in behalf of more statistics in the electrical industry have been much appreciated.

ranks in both office and factory were represented in the cast and all worked equally hard for the success that was achieved.

At the conclusion, an enjoyable dance was held, with Eddie Layton and his orchestra once more in evidence.

New McDonald & Willson Bulletin

A new fixture catalogue known as Bulletin No. 21 has just been put forth by McDonald & Willson, Limited, lighting fixture manufacturers, of Toronto. This bulletin is intended to supplement their catalogue No. 20 which was issued in November last; it contains about twenty-five striking designs of moderately priced electric fixtures, especially suitable for lighting the average home; and as the values are said to be unusually attractive the trade will doubtless find this bulletin very interesting and useful.

Backus After More Power

Application has been made to the Ontario Government by E. W. Backus for permission to build a dam on the Manakwan River at the outlet of Lake Lac La Croix and another on Little Vermilion Lake, on the International boundary between the Province of Ontario and the State of Minnesota. The upper dam is for the purpose of diverting water through Little Vermilion Lake, and the power development is to be at the outlet of the lake. It is estimated that about 20,000 horse power can be generated from this development.

Give Regular Scholarships

The Westinghouse Electric & Manufacturing Company announces the usual four scholarships as a memorial for those in the employ of the company and its subsidiary companies who entered service during the World War. The scholarships are granted for one year only, but will be continued for the full course, provided the scholar maintains the academic and other standards required by the college or institution in which he elects to pursue his course of study.

New Steel Switch Block

The Lester Electric Co., Ltd., of St. Thomas, Ont., are manufacturing a steel switch block, as shown. This switch block fits flush, being attached to the lath, and is claimed



to save time, labor and expense, in addition to making a more attractive appearing job.

Erecting Billboards

The Canadian General Electric Company are arranging to erect a number of billboards throughout the rural districts, on the more important highways, carrying these three messages:

Do its Electrically.
Buy Canadian-made Electrical Goods.
Buy Electric Goods from Electric Stores.

This should have a very good influence on the attitude of mind of the general public towards electrical goods, who will thus be led to make inquiries of their merits. There is still a fair percentage of our population that does not know of the existence of such things as electric stores.

The Swedish General Electric Co. recently closed a contract with the Hydro-electric Power Commission of Ontario for a motor-generator set of 10 kw. capacity to be installed in the Chippewa power house at Queenston Heights.

Sangamo A. C. Watthour Meters

The Sangamo Electric Company, Springfield, Illinois, are distributing bulletin No. 55 describing alternating current watthour meters, single phase and polyphase. This bulletin supersedes bulletin No. 46. It is well illustrated and contains a great deal of valuable descriptive matter regarding this company's products.

McDougall, Pease & Friedman, consulting engineers, have removed from the Drummond Building to 85 Osborne Street, Montreal.

Mr. George Leacock, sales manager Moloney Electric Company of Canada, Ltd., left recently on his annual trip to the Coast, visiting branches at Winnipeg, Calgary and Vancouver on the way out. Mr. Leacock expects to be away about six weeks.

The Canadian Electrical Products Co., Brantford, manufacturers of electric water heaters, has been taken over by Thermo Electric, Ltd., Brantford.

Educating the Public to Prevent Accidents

In the discussions that have been running in the Electrical News recently regarding the prevention of electrical accidents there have been many writers who advocated the education of the public as the best solution. Without doubt, much can be gained by telling the public the facts in simple, non-technical language, leaving it to their common sense and good judgment to take the necessary precautions. Many municipalities and private companies are constantly warning their customers, and there has just come to our attention a little campaign waged by Mr. W. R. Reynolds, Superintendent of the Listowel Public Utilities Commission. Mr. Reynolds prepared a series of educational talks, printed them on cardboard, post-card size, and had them enclosed with the accounts as they were sent out monthly to the customers. The idea is so good that in this issue we reproduce some of the cards used by Mr. Reynolds. They are interesting enough to be read by any and every member of the average family, pointed enough to make the reader think and brief enough to be carried away in the memory.

Number 1 of a series of post card size "Educators" sent out by Listowel Public Utilities Commission.

LIVE WIRES

AS LONG as power wires are strung overhead there will always be a certain degree of danger from "live wires." Storms, deterioration, accidents and the acts of thoughtless persons in breaking line insulators by throwing stones, or shooting at them, sometimes cause wires to break and fall. Either hanging in the air within reach or lying on the ground live wires are a menace to the safety of persons who might come in contact with them.

Now, if YOU ever happen to see a live wire:—

Don't touch it yourself. Don't let anyone else touch it.

Stand by and guard while you send word to the power house for help.

SAFETY FIRST AND ALWAYS

Telephones:—Power House, 12. Superintendent, 141. Engineer, 122.

W. R. REYNOLDS, Supt.

Listowel Public Utilities Commission.

This is the first of a series of circulars to be sent out for the purpose of educating the public with a view to minimizing the danger from electrical appliances.

Electrical Repairs Do You Make Your Own? Are You Sure You Know How?

FIXING AN iron cord, changing sockets on portable lamps, lengthening a cord here and there, adding an extra light,—any of these operations look simple. They are simple if you know how—but any electrician can tell you of fuses blown, cords burned up, nasty shocks, and trouble generally caused by work done on wiring and appliances by people who knew so little about electrical work that they did not know what risks they were creating. Electricity is a good and safe servant if used intelligently.

Be sure you know how to make any repairs or alterations to your electrical equipment—or leave it alone.

This is a warning to bring home to you the fact that unless you know exactly what you are doing when you try to do electrical work you may endanger life or cause a fire.

Be Sure—Find out if you are not sure.

SAFETY FIRST AND ALWAYS

Telephones:—Power House, 12. Superintendent, 141. Engineer, 122.

W. R. REYNOLDS, Supt.

Listowel Public Utilities Commission.

This is the second of a series of circulars to be sent out for the purpose of educating the public with a view to minimizing the danger from electrical appliances.

No. II. of series warns against amateurs meddling with electrical repairs.

No! Any Old Fuse Will Not Do

It is a common practice when a fuse burns out, to replace it with any fuse lying around. The burned out fuse may be 6, 10 or 15 ampere size and the handy fuse may be 25 or 30 size—it makes no difference, a fuse is a fuse—so the inexperienced may say, and they use the fuse they have in ignorance of the trouble that may result.

Now fuses are safety devices. They are made in different sizes because different sizes are needed in order that each may play its part, that is—safeguard. When you replace a burned out fuse with a size larger than it should be, you at once introduce an element of danger that was not there before. A 30 ampere fuse, for instance, will carry five times as much electricity as a 6 ampere size. A 6 ampere fuse may be absolutely necessary for safety, yet a 25 or 30 ampere size is often substituted and may be causes a fire.

Fuses must be right size to do their duty. Be sure of the size. Using an over size fuse is just as foolish as hanging a monkey wrench on the safety valve of a boiler.

Using an over size fuse is taking a chance—DON'T

SAFETY FIRST AND ALWAYS

Telephones:—Power House, 12. Superintendent, 141. Engineer, 122.

W. R. REYNOLDS, Supt.

Listowel Public Utilities Commission

This is the third of a series of circulars to be sent out for the purpose of educating the public with a view to minimizing the danger from electrical appliances.

No. III. explaining the value of fuses as a necessary protection.

Defective Portable Cords Are Dangerous

LONG CORDS connecting electric lights, irons, heaters, etc., may easily become dangerous. Cords become worn and the bare wire exposed, rendering them dangerous to handle especially in damp basements, in bath rooms and around steam or water piping.

Don't take a Chance—See that any cord you use is of good quality in the first place; see that it is not frayed, worn or wire exposed; make sure it is safe in every way, socket and all. **Be sure about it. Find out about it if you are not sure.**

Check up your cords now, you might have an accident tomorrow.

SAFETY FIRST AND ALWAYS

Telephones:—Power House, 12. Superintendent, 141. Engineer, 122.

W. R. REYNOLDS, Supt.

Listowel Public Utilities Commission.

This is the fourth of a series of circulars to be sent out for the purpose of educating the public with a view to minimizing the danger from electrical appliances.

No. IV—Don't take chances with a frayed cord—especially if used in damp places.



Electric Railways

Accident Prevention is Everybody's Business

Traffic Laws and Traffic Law Enforcement Both Inadequate

By R. MAYNE READE*

Superintendent, Quebec Railway, Light, Heat & Power Co.

I suppose there is not one here who has not thought more or less about the subject of accident prevention. For the past generation utility men have been talking about it and thinking about it; and some have had their minds made up about it, and doubtless some have not, and although all these years have rolled away, this question comes up, addressed to each of us to-day, "Do you realize that Accident Prevention is Everybody's Business?"

Accident Prevention—what meaning do these words convey to us? I shall try and define them as we understand and feel them.

Accident prevention is a duty of Christian honor. To believe in it not only because it seeks to save life, save money and promote efficiency, but because we think we see within it, or underneath it, the effort to stimulate fundamental spiritual ideals of better human co-operation, more thoughtfulness for the welfare of other people, and sounder mental and moral discipline.

Matter and Motion.

Every industry including electric railways, pays for but two things, matter and motion. Anything that occupies space is matter. The cost of materials and supplies is fairly well fixed and approximately the same with all of us. The difference in cost of using the product depends on what is paid for motion, and how carefully and efficiently this motion is done. In our efforts to obtain the best results we generally find them hampered in the quality of the service rendered by the human element, who under the cloak of selling capacity have shown that human weakness in their make up by being what is commonly known as time servers.

Probably you are going to offer a lot of excuses and arguments as reasons for your conditions and costs of motion, but that will not lower the costs or stop the extravagance.

There is just one unpardonable business sin; making explanation why you failed to get better results. There's a reason. First: Efforts have only been spasmodic. Second: Because this great humanitarian work has not been seriously taken by the majority of the people, they having failed to realize the fact that "Accident Prevention for the safety of life and limb is everybody's business."

If I were to ask you what you think of any prominent man, you would already have your mind made up about him. If I were to ask you what you thought of prohibition, you would speak right out and tell me your opinion in a minute. Then **why** dodge the issue? Why should people throughout this Great Dominion of ours not make up their minds about the Safety First movement and take their stand for or against it before the crape appears on their door?

If I were to ask you to think of the amount of effort

and money already expended on the Safety First movement, including the Great War just fought with the loss of many millions of lives to make the world safe for democracy and democracy safe for the world. The many volumes that have already been written covering this subject for the benefit of mankind, the continual work of the National Safety Council, the American Museum of Safety, the Red Cross and other kindred organizations, you would be ready to say that every man, woman and child, every public utility, traction company, industry and corporation, both great and small, every civic and provincial organization had been educated and stimulated by these efforts to the gospel of self-preservation, that recklessness and carelessness in the human element had been eradicated, and that this movement had become an established order in the routine of our daily life.

Now, let us look on the other side of the picture and see what it reveals. Pick up your daily newspaper, every day



Mr. R. Mayne Reade

in the year, and as you read through the pages you are appalled at the horrible selfishness displayed there in cold type, at the awful toll of accidents and deaths happening on our streets, in our industrial establishments, even in the homes of the people, and you wonder how these things can be, how they could happen in a so-called Christian country. Suddenly you begin to realize there is one thing we as conscious, reasoning beings can do which must tend to the further development and security of human well-being, that we must be imbued with that moral sense of our responsibilities as sincere thinking men, throw down the gauntlet of safety to fight this selfishness so much in evidence in every walk of life, to help men to educate themselves, to help men to save themselves—that all our efforts along these lines must be persistent and systematic in driving out this recklessness and carelessness by devoting our services, not of time but of thought and action in that spirit of brotherhood, and "Am I my brother's keeper?"

We have to admit that some progress has been made, but

*Before Ottawa Convention Canadian Electric Railway Association.

there is more to be done and that can be done, as we have only scratched the surface as yet. Why pussyfoot about this all-important matter upon which hangs the health and well-being of the Canadian nation? Let us travel in the middle of the road with our efforts hitched to a purpose and get after that element of our population that belongs to the procrastinating class—the “let George do it” kind. We find this attitude in all classes of the people, even among our most educated and cultured business men and women, on down through all walks of life and varied vocations, who waste precious effort in antagonizing the liberty of the citizen on the most trivial matters, instead of devoting such time and services to educate by example and precept the principles of Safety First on our streets with the rigid enforcement of traffic regulations, so that each and every citizen may travel in safety along our public highways, and to insure this safety insist that the law be obeyed which has been enacted for the general good and welfare of the people. There are some ready at all times to find fault, censure and criticize, seldom or willing to lend a helping hand; some may donate money to the cause, but their personal efforts and personal sacrifices are also necessary as well as their gold. Not that these people are antagonistic to the movement or not in sympathy with the ideals of Safety First, but its importance to the welfare and prosperity of the nation has not been seriously considered by them. Oh, what a difference if Safety First were like scandal! Everybody would be out pushing it along, but we have arrived at that stage in the life of this movement to realize that it will take more than a **slogan** to convert the public to a spirit of brotherhood.

Sir John Lubbock, the first Lord Avebury, said: “Life is a great gift. And as we reach years of discretion most of us naturally ask ourselves what should be the main object of our existence. Even those who do not accept ‘The greatest good of the greatest number’ as an absolute rule yet admit that we should all endeavor to contribute as far as we may to the happiness of others.”

To accomplish this end then there must be a process of continuous weakening of selfishness, and the continuous strengthening of sympathy within the individual by the inoculation of that spirit of brotherly love, that eternal spirit which touches the human heartstrings more effectively than any other interest known—except possibly the present-day craze for the almighty dollar.

I am going to quote Theodore Roosevelt; listen to what he said: “This country will not be a good place for any of us to live in unless WE make it a good place for all of us to live in.” He was speaking of the United States, but his message is just as applicable to Canada to-day as when he delivered this call to his own country.

We have all more or less conducted Safety First campaigns, beginning with our own employees, and in our educational work it has been found necessary to season it with a certain amount of discipline. Have we not found that the ratio of effort to the results obtained by education has been greater than the ratio of effort by the discipline method, because the former carried with it a spirit of co-operation while the latter was less humanitarian and suggested something of the strong arm method?

The object sought being to make the employee as well as the public realize that Safety First is just as important to them as to their employer and to the community as any work they undertake. Experience has taught us that owing to man's tendency to exercise what he calls his personal liberty and take chances, assuming risk of danger, acts of negligence,—this so-called other element in human nature, has made it imperative that education and discipline must go hand in hand, for neither alone will suffice. We have consistently supported regulations, ordinances and legislation for the protection of

the many and punishment of the recalcitrant few. We have worked in harmony with our municipal councils, and have co-operated with public authorities to carry out these disciplinary measures as effectively as possible. We have continuously circularized automobile clubs and individual owners of cars in the interest of safety. We have and are carrying safety slogans around posted up in our street cars as an ever reminder to the car riders and the general public to “Watch their step.” We have had erected at the company's expense “Danger Signs” at important street intersections, and have equipped our rolling stock with the latest safety devices, yet politics more than anything else has increased our difficulties from the Atlantic to the Pacific.

Compensation laws have been enacted by our legislatures in the different provinces, the Governments having recognized the necessity of disciplinary measures, not only for the great moral objects of accident prevention to preserve the life and limb of man, but for the proper control and supervision of the assumption of risk, indifference and thoughtlessness, negligence and weaknesses of human nature. We have installed safety devices in our workshops for the protection of our workmen around the machinery wherever necessary, shop cleaning and sanitation inaugurated and carried out systematically, proper lighting arranged efficiently, and fire protection apparatus all have their effect in demonstrating our sincerity and frankness in safety work, and while it is corrective education, largely for the employee, it is most helpful in the seeking of co-operation rather than attempting to educate the public. Some companies may have progressed further in the work but taken on a fair average that is about where we stand to-day.

But we cannot stop there. We must continue to tune up our minds, which draws its food from the medium of intelligence and thought, for this nourishment is necessary to give body to our work, in action as in reasoning when in quest of new ideas. The popularity of the safety movement should grow as more of us begin to appreciate that its benefits are individual as well as general. For we must always remember the greatest asset in Canada is the Canadian people.

Traffic Law Enforcement Insufficient.

Ten years ago the steam railroads headed the list in the number of fatal accidents, followed by electric railways, industrial establishments and others. To-day it is known that automobile accidents not only are at the top of the list in the United States and Canada, but the total fatal ones credited to them is more than the combined total of all other classes of accidents on the calendar. This fact most assuredly indicates that there is a something radically wrong in the administration and regulation of our traffic laws throughout the country. It is quite patent to all the seriousness of our street hazards has been brought about largely by the increase in the number of automobiles in use. “Permit laxity in traffic law enforcement and accident death tolls will continue to grow.” “Regulate traffic—enforce the traffic laws—and the accident death toll will drop.” This briefly, is the opinion of the heads of police traffic of twelve of the largest cities on this continent, recently visited by Mr. L. J. Smith, Director of the National Safety Council, in a study of traffic methods, the object being to find from the experience of other cities more effective ways of meeting the serious accident situation in Kansas City, which shows an alarming increase in traffic accidents.

Are our present traffic laws adequate?

Is traffic law enforcement efficient?

The answer in both cases is NO!

It is just as well to call a spade a spade to arrive at the truth for the proof of the answer is in the fact that in almost all large cities the automobile death toll is increasing, and while traffic law and enforcement are not entirely responsible,

the fact remains that they are the foundation of the solution of the accident problem. Analysis of traffic laws shows their purpose is to safeguard the masses of the people, restrain the reckless, avoid congestion and confusion, and give equal rights to all on the streets.

I have said that traffic laws are inadequate. This applies to all cities, not because the laws in themselves are not sufficiently regulatory, but because one law primarily needed to make all traffic laws enforceable is missing in most cases, and when it is found it needs strengthening.

The missing statute is the driver's or operator's license law, providing for the mental and physical examination of the applicants before licenses are granted to drive a car or vehicle—a law which should be enacted by every province in the Dominion.

In the city where the traffic laws are inadequate or unjust, when enforcement of the laws is unfair, where the motorist or driver with influence can escape punishment, the result is that the citizens as a whole do not take seriously the police or courts, readily blame the traction company if in any kind of collision with a street car, oftentimes procuring doubtful witnesses to substantiate their alleged claims, and violations increase, bringing an increase in accidents, and additional financial burdens on the treasury of the utility.

There are many drivers on our streets whose utter disregard of all principles of safety is a constant menace, not only to pedestrians, but to other drivers as well. Many of them wealthy, with political influence, consider the police court fine as a "Joke" to them; sometimes they pay the fine or dodge it through influence, going out to continue their sprees and recklessness. This class of drivers will be reached through the Driver's License Law.

We have the beginner, another menace, and the physically incompetent. Why should the former be allowed to guide an engine of destruction through crowded streets, or the latter permitted to face situations constantly that require physical as well as mental competency?

Too drastic some will say! Not a bit of it!

Every careful, competent driver—and all pedestrians—should welcome such a law. Motormen driving street cars should also come under the same requirements of the law, procuring their own licenses to have the right to operate a street car on the community's busy thoroughfares. It is in the interest of the inexperienced driver to make him safe before he may drive. The physically and mentally incompetent, must not be permitted to drive under any circumstance. There is too much at stake when human life is the price.

The law should not only set the fine but require the judge to assess the fine on proof of guilt—and in this case, the penalty should be jail instead of a fine. A judge "who has his own ideas" is not safe in a traffic court; the laws should fix his decision and compel penalties fitting the offence.

Every city in every province of the Dominion should have its traffic court, there should be no mixing of cases, as the court would be able to give its individual attention to traffic problems, and not be distracted by other kinds of troubles and tangles.

Accident Prevention a National Issue.

Our Government during the war spent millions of dollars in publicity to enlist men for our armies, for raising Victory Loans to carry on successfully to win; let them now carry on if they are sufficiently interested in the preservation of humanity and the reduction of accidents and the conservation of its crippled man-power—be it city, province or Dominion, let it enact a law calling on publishers of newspapers and periodicals, upon solicitation, voluntarily and gratuitously to give up a sufficient amount of space according to the size of the periodical and devote this space for humanity's sake.

Our Dominion, provincial and local health agencies now

realize that accident prevention which is everybody's business may be developed to a level in keeping with other standards of modern business establishments. It is their duty to the country to lead the way on a much larger scale than at present and reduce the "IF" in life, by planting the seeds of safety in every city, town and hamlet in Canada for life indeed must be measured by thought and action, not by time.

I would suggest that every theatre curtain, programme and billboard throughout the Dominion be made a Canadian Safety Billboard—every business card, every letter head should carry a line or two on safety. The regular postage stamp of the three cent variety should carry the safety message on every letter posted in Canada.

Our provincial governments should add a safety section to their education departments, and introduce safety instruction in all the public and private schools to reach the workmen and the grown-ups through the child, for the best insurance policy is a careful person.

I would further suggest that the electric railways of the country as a part of their safety campaigns, appreciating the value of making safety a community proposition, might during the annual exhibition in their respective provinces, stage an exhibit on both traffic and public safety. I believe that interesting exhibits of this kind would be instrumental in bringing home to all of the people in their community a sense of responsibility and a recognition of the principles of safety and precaution which are so important to-day for the well-being and security of all mankind.

A Life Saved is a Life Saved.

It makes no difference whether a drowning man is pulled out of the water just in time to save him or whether in a less spectacular way, through a system of training and education, he is kept from falling under the wheels of a street car, or whether by the application of approved safety devices he is kept from being ground up in the gears of a machine. The result is the same. It is a life saved. And it is because hundreds of big men—employers in industry—have responded to the call of humanity that many lives have already been saved. For every reduction that has been made in an accident record on any railway or in any industrial plant means that lives have been saved, just as truly as if they had been snatched from a watery grave a few seconds before life would have become extinct.

In every community, from the largest city to the smallest hamlet, there leads a road to destiny: as we come to the end of the long, long trail, we arrive at a silent city. On the finest hill in the cemetery where lots are expensive, we read on a great mausoleum of stone—

"YOUTH"

IN MEMORY OF OUR BELOVED SON, AGED 23.

The family history includes also a line omitted from the monument, "Killed by carelessness."

And in these graveyards with youth and with middle age are buried success, opportunity, joy, fame, genius, wealth and happiness. This is the price of carelessness. This is the WHY of the Safety Movement: Everybody's Business.

There are men enough here this morning; there are men enough sitting here within the sound of my voice to-day, if they were inspired by the spirit of brotherly love and counted it the great privilege of their life to do this work of the Almighty—there are men enough here to save this country, to make it the best and safest place on God's earth to live in.

You will remember the days of the war, and how ashamed of himself a man felt who never touched with his finger the great struggle in which Canada was engaged. Oh, to go through this life and never touch with our fingers this vast and Christian work of Safety First, and when the cry of triumph arises at the end to stand there, not having done one little, unknown, unnoticed thing to bring about that which is

the true life of the men in this great cause, that is awful. And I dare believe there are some men here this morning who, failing to be touched by every appeal, will still lift themselves up and take upon them the duty of men, and be soldiers of Safety First, and have a part in this humanitarian battle, and have a part somewhere in the victory which is sure to come, and which depends so much upon nobility of purpose, persistence of effort and unselfish service.

In conclusion, I want to emphasize that we need our clergy to help along this good work by preaching safety sermons and holding safety revivals. When we have done all these things we can point with a pride and a clear conscience to a useful life and when the grim reaper calls us, the Ruler of the Universe can justly say: "Well done, good and faithful servant, enter thou in."

British Engineer Favors Railless Traction as Compared with Motor Omnibus

A British engineer writing in "The Tramway and Railway World" on the relative merits of the motor omnibus and railless traction in the city of York, explains that experiments with motor busses have proved costly and unsatisfactory. He first explains that York is typical of many towns where the present high cost of permanent way prevents many desired extensions to the tramway system and that, as an alternative, busses were installed to placate the demand for public conveyance. The writer speaks of the optimistic attitude of the operators and public alike towards this means of conveyance, stating that "In the minds of many harassed authorities the motor omnibus appeared not merely as an expedient, but as a competent substitute for tramways on all new routes. To some, it even promised relief from an outlay on renewal of wornout tracks."

The article goes on to state that to a large extent these expectations were founded on the extraordinary success of the omnibus in London, which was due to a combination of remarkable technical ability and an unprecedented density of traffic.

The article continues: "In most cases the first results of the motor omnibus experiment confirmed the hopes of those who had embarked on it. The services were popular, earnings were high, new traffic was brought to their existing tramways, and working expenses left a margin of profit."

This happy condition did not continue, however, for the article goes on to say, "No very long experience has been needed to upset the optimistic expectations of those who overlooked the disadvantages of the internal combustion engine. It was found that repairs were numerous and costly, that frequent overhauls reduced the annual mileage of the vehicles calculated upon, and that the useful life of a motor omnibus was somewhere in the neighborhood of five years."

In the city of York battery omnibuses were also tried, but the final result was that the petrol conveyances proved unduly costly and troublesome and the battery vehicles, though more reliable and economical, were too slow for satisfactory passenger service.

At this stage it was decided to experiment with the railless trolley, and the following extract from this engineer's article tells of the results obtained with this method of transportation:

"It was then decided to make an initial installation of railless trolleybuses on a route one and a quarter miles in length, commencing at the Market Square and terminating at Heworth. No severe gradients are encountered, but the service is conducted over some of the narrowest streets of the city, and traverses numerous sharp bends and turns. On account of these conditions the vehicles have been constructed to the exceptionally narrow overall width of 6 ft. 3 in., and as they will often be required to deal with very light traffic

they have been designed on the 'one-man' principle. The entrance door is in front, and under the control of the driver, and fares are dropped into a pay-as-you-enter device. The driver's vestibule is enclosed, and has an entry on the off-side. The cars are of the single-deck type, and have seating capacity for 24 passengers. There are five rows of seats at the back and two rows of seats arranged longitudinally, the off-side seat accommodating 10 passengers and the near side 9.

"Each trolleybus is equipped with two 23 B.h.p. motors, arranged for series parallel control, and with two 'Railless' patent cam-controlled trolleys, which permit of a very light upward pressure of the trolley wheels against the wires, and allow the cars to deviate at full speed 17 ft. on either side of the centre of the road without risk of de-wiring. Each vehicle is fitted with hand and foot operated service brakes on the rear wheels and emergency foot brakes on the motor shafts."

The same issue contains a brief article on railless traction in Bradford. It will be remembered that the Bradford Corporation Tramways has been operating railless trolley vehicles for some time, and the article in question deals with a six-wheeled, double-deck, railless vehicle. Half the weight of the vehicle is carried by the rear axle, and the other half is divided between the two front axles, making a quarter of the weight on each rear wheel and one-eighth of the weight on each front wheel. The Bradford corporation are also planning to operate their existing railless routes with "one-man" cars.

The increase in street car fares in Winnipeg, granted by the Public Utilities Commission, is disputed by the city and will be taken before the Privy Council for settlement.

Mr. James Cumberland, M. E., has been appointed general manager of the Maritime Coal, Railway & Power Co., Ltd., Moncton, N.B., and Mr. Norman T. Ayard, formerly chief accountant of the company, has been promoted to the position of assistant manager.

The officials of the Hull Electric Railway System recently gave the one-man safety car a try-out and are, it is said, well pleased with this type of car.

Mr. J. Gravelle, 116 Main St., Hull, has secured the contract for electrical work on a factory building being erected on Hull Street at an estimated cost of \$20,000.

Schumacher Gray Co., Ltd., Winnipeg, Man., has been awarded the contract for electrical work on a theatre building being erected at 626-630 Main St., Winnipeg.

Mr. H. W. Newman, Kingston, Ont., has been awarded the contract for electrical work on a building on King St. that is being altered into apartments for Mr. B. B. Warrell.

Five Points

Electric railways are essential industries.
They must expand to meet growing needs.
To expand they must have new capital.
New capital requires a restoration of credit.
Restoration of credit needs public co-operation instead of antagonism.—W. E. R. Service News.

Current News and Notes

Cap De la Madeleine, Que.

P. LaCroix, Cap De la Madeleine, Que., has secured the contract for electrical work on a tenement building recently erected in that town for Mr. Wiley St. Cyr.

Chilliwack, B.C.

Mr. C. J. Green, who for the past fifteen years has been connected with the British Columbia Electric Railway Company, has been appointed to the position of freight and passenger agent for that company at Chilliwack, which position was left vacant by the death of Mr. Shadwell a short time ago.

Dartmouth, N.S.

The town council of Dartmouth, N.S., are contemplating the installation of a new fire alarm system that would cost in the neighborhood of \$14,000.

Edmonton, Alta.

The Alberta Government Telephones, Edmonton, Alta., are contemplating the construction of telephone lines requiring 2,000 miles of pole line and 4,000 miles (metric) of copper wire.

Galt, Ont.

The Ontario Hydro Commission have granted permission for a debenture issue of \$135,000 for the erection of a new station and office building at Galt, Ont. With a view to building up the power load the Galt Public Utilities Commission have engaged Mr. J. W. Hewer as salesman of electrical appliances, and as an inducement will accept monthly payments for same, when so desired, taking a lien on the goods.

Hamilton, Ont.

Messrs. Robertson & Dix, 13 Rowanwood Ave., Hamilton, have been awarded the contract for electric work on a residence recently completed on Gage Street for Mr. B. Spencer.

Messrs. Culley & Breay, 35 King St., Hamilton, Ont., have secured the contract for electrical work on a store building being erected on Ottawa St. in that city for Mr. Harry Clark.

The Canadian Westinghouse Company's tender of \$33,420 for transformers was accepted by the Hamilton Hydro-electric Commission.

Mr. F. Thornton, 310 Ottawa St. N., has secured the contract for electrical work on four residences being erected on Cumberland Avenue and Burriss St. for Mr. W. D. Armstrong, Spectator Building, at an estimated cost of \$40,000. He has also secured the contract for electrical work on the market stalls which will be put in at an estimated cost of \$18,000.

The Hydro Commission's report for the year 1920, as prepared by Mr. E. J. Sifton, superintendent of the system, shows a net profit of \$16,975. The total plant investment in Hamilton is placed at \$1,485,000.

Montreal, Que.

Mr. P. Ackerman gave an interesting address recently at the Engineering Institute, Montreal, on "Relay Protective Features of the Toronto Power Company's Transmission and Distribution System."

Mr. J. A. St. Amour, 2171 St. Denis St., has secured the contract for electrical work on a building, at the corner of

St. Elizabeth and St. Catherine St. E., that is being altered for a bank at an estimated cost of \$28,000.

Excavation work has been commenced on twenty-six residences that are to be erected on Gouin Boulevard, at a cost of \$130,000 for Mr. G. Clermont, 2303 St. Dennis St. The sub-trades, including electrical, will be let. Messrs. Brunet & Vizina, 601 Mount Royal Ave. E., Montreal, are the general contractors.

Mr. J. A. St. Amour, 2171 St. Denis St., Montreal, has secured the contract for electrical work on a bank building recently erected on St. Catherine St. W. for the Bank de Hochelaga.

Ottawa, Ont.

The Ottawa Amateur Radio Association, through arrangements with the Naval Service Department, recently enjoyed a musical concert by radiophone. During the evening messages were picked up from the wireless stations at Washington, D.C., and Arlington, Va. Major W. A. Steele, honorary president of the Association, gave a scientific address.

Government officials at Ottawa, Ont., were recently in communication by telephone with the President of Cuba, at Havana.

Outremont, Que.

A by-law has been passed authorizing the expenditure of \$36,750 for underground conduits, fire alarm and police signal system and an extension to the lighting system at Outremont, Que.

Parry Sound, Ont.

After being almost a month without electric energy, caused by serious damage to the power house during the spring floods, the town of Parry Sound is again using electric lights and factories are resuming operation.

Peterborough, Ont.

The Peterborough Hydro Commission had a "Hydro booth" at the recent Peterborough Motor Show in which a demonstration of electric labor-saving conveniences for the modern home was given.

St. John, N.B.

The contract for clearing the right of way for the transmission line from the provincial government hydro-electric development plant at Musquash to St. John, N.B., a distance of 13 miles, has been awarded to the Maritime Construction Company of St. John. The work begins immediately.

Stratford, Ont.

Messrs. Bennington & Young have secured the contract for electrical work on a store building being erected for J. R. Myers & Sons, Stratford.

Mr. F. C. Whatnough has been awarded the contract for wiring and electric fixtures for the Registry Office and Jail, Stratford, at a price of \$800.

Messrs. Bennington & Young have been awarded the contract for the electric wiring and fixtures at the courthouse for which they will receive \$2,000.

Sydney Mines, N.S.

The Cape Breton Electric Company, has purchased the business interests and property of the Sydney Mines Light and Power Company for a price approximating \$80,000.

Three Rivers, Que.

Mr. N. Plamondon, Three Rivers, Que., has secured the contract for electrical work on a tenement building being

erected on St. Francois Xaveir St., Three Rivers, at an estimated cost of \$20,000; also, for a tenement building on St. Ursule St., erected at an approximate cost of \$10,000.

Toronto, Ont.

The Canadian Independent Telephone Company, Toronto, sent out the reports on the recent referendum by radio-phone on a wave-length of 450 meters, which would reach all radio receiving stations within 100 miles.

Messrs. R. A. L. Gray & Co., 85 York St., have been awarded the contract for electrical work on an addition to a warehouse at Wellington & York Sts. for S. F. McKinnon & Co., Ltd.

Messrs. Nason Bros., 10 Ethel Ave., Toronto, have been awarded the contract for electrical work on two residences being erected on Aldridge Ave., Toronto, for Mr. H. C. Fisher, 62 West Lynn Ave.

Mr. B. C. Taylor, 25 Marchand Road, Toronto, has been awarded the contract for electrical work on three residences being erected at 102 to 106 Blackthorne Ave., Toronto.

Mr. N. McLeod, 820 Danforth Ave., has secured the contract for wiring residences being erected in the Danforth Avenue district at an estimated total cost of \$75,000.

The city council recently authorized the finance commissioner to issue debentures to the amount of \$10,000,000 for the purchase and equipment of the electric railway lines.

The Canada Gazette announces the incorporation of the Phelps Power & Light, Limited, with head office in Toronto, and a capital stock of \$50,000.

Messrs. Moss & Stocks, 14 Price St., have been awarded the contract for electric wiring on an addition being built to the Roden Avenue school.

Messrs. Bates & McPherson, 28 Adelaide St. W., have been awarded the contract for telephones to be installed in an addition that is being built to the Roden Ave. School.

A special meeting of the shareholders of the Canadian General Electric Company is to be held on June 15 to consider the question of an increase in capital. It is proposed to increase the common stock from nine to eighteen million dollars, which with the two million preferred would raise the capital to \$20,000,000.

Beattie-McIntyre, Ltd., 72 Victoria St., have been awarded the contract for electric wiring a Royal bank building being erected at St. John, Newfoundland, at an estimated cost of \$230,000.

Mr. B. Balment, 77 Westlake Ave., has been awarded the contract for electrical work on residences being erected on Rhodes Ave. for Mr. D. Fcttis, 288 Danforth Ave., at an estimated cost of \$37,000; also, for four residences on Chisholm Ave. being erected at an estimated cost of \$25,000.

Episcopal Services Heard by Presbyterians by Means of Wireless Telephony

For the first time, so far as known, wireless telephony has been used to transmit services from one church to another in order that a congregation without a regular pastor could have the benefits of Sunday evening worship. The churches involved the Calvary Episcopal and the Herron Avenue Presbyterian, both of Pittsburgh, Pennsylvania. During a period of months the Sunday evening services of the Calvary Episcopal Church have been broadcasted from a radio test station in East Pittsburgh, Pennsylvania. These services have been eagerly awaited by radio amateurs all over the United States.

The Herron Avenue congregation has been without the services of a regular pastor for some time, being forced by circumstances to use any substitute available. One or two

of the congregation, being wireless enthusiasts, got in touch with the Westinghouse company, requesting it to install a small receiving outfit in the church in order that the members could hear the Calvary services. This was done and a compact set consisting of a loop antenna, amplifier and condenser was placed upon the rostrum in front of the pulpit. The loud-speaking horn rested directly on the pulpit.

An expectant throng filled the church and were not disappointed, for the voices and music of the Calvary choir, rector and organ were received clearly and distinctly. In spite of the difference between Episcopal and Presbyterian services, the latter congregation followed the pastor in the former throughout. Even during the offertory hymn, contributions were accepted. During the sermon of the Calvary rector, intense interest was maintained at the Herron Avenue Church so clearly and distinctly was the message received.

It is hard to say just what demonstrations like this will lead to, but certainly it proves the great flexibility of wireless telephony. There may be in the future a central pastor who will talk to thousands of congregations situated in all parts of the world, but this may take time. The idea is not far-fetched, however, as the transmitting of the Calvary services proves.

"Electrical News" Talks to Shoe Stores

We reproduce below a full page advertisement that "Electrical News" ran in the April issue of "Footwear in Canada."

It is our belief that the stores throughout the country are not giving their lighting an important enough place in their sales plan. All the enquiries that are received from this and similar advertisements will be turned over to readers of Electrical News in that district from which the enquiry is received.

Sell It With Light

Attractively illuminated store windows and a glimpse of a cheerful interior will do much to encourage customers to enter your store.

Once inside—your merchandise is displayed to the best advantage by scientifically designed lighting.

Let us introduce you to a Lighting Expert

Because if your store is not efficiently illuminated by electricity, and no one has shown you how costs can be cut down and sales boosted by proper lighting, we shall feel that we have not fulfilled our mission as the National Electrical Journal of Canada.

Electrical News

Engineering Contracting Merchandising Transportation

349 Adelaide Street West, Toronto

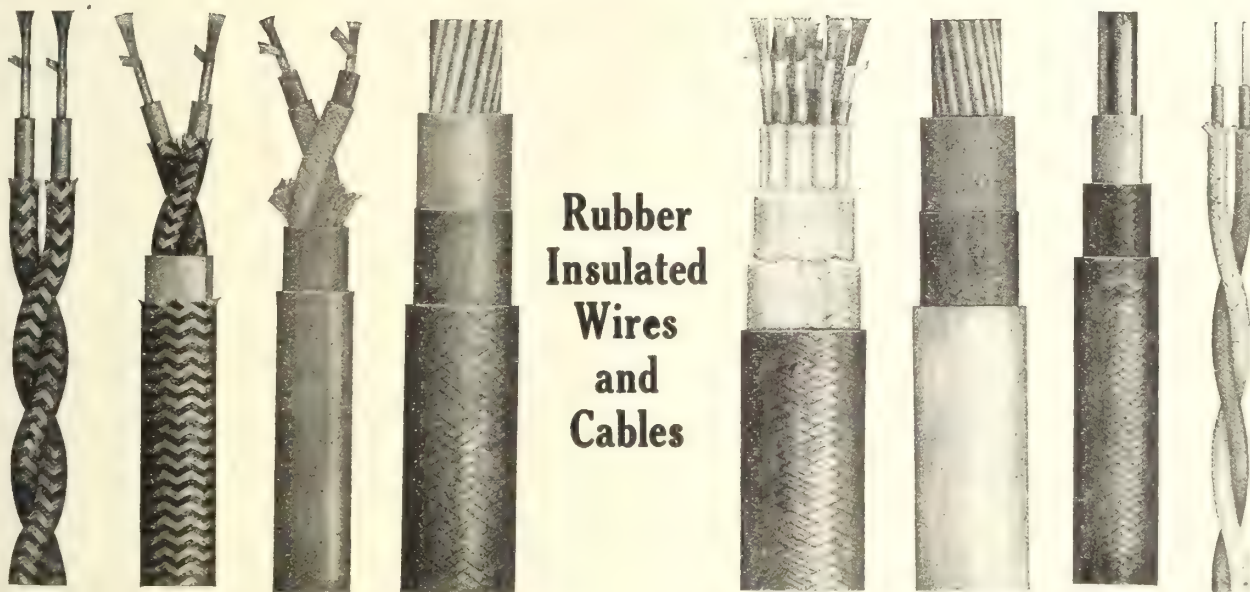
\$2.00 a Year

Twice a Month

WIRES AND CABLES

Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889

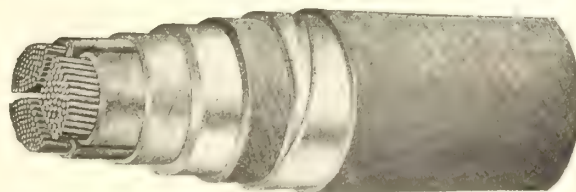


**Rubber
Insulated
Wires
and
Cables**

Magnet Wires and Cables



Power Cables



**Weatherproof Wire
Cadmium-Copper Wire**

Telephone Cables

**Trolley Wire
Enamelled Wire**

Head Office and Factory

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MONTREAL

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Motors Wanted

WANTED—to buy D.C. Motors from 2 to 10 horsepower. Write Kaufman Rubber Co., Limited, Kitchener. 9-12

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1. Walter Clinton, Welland, Ont. 22-11

For Sale

DIRECT CURRENT MOTORS, 110 volts and 220 volts, from 2 H.P. to 10 H.P. Many with variable speed rheostats; also pulleys, hangers, fans, etc. Write for list. Lawson & Jones, Limited, London, Ontario. 8-9

60 to 25 Cycles

Has your frequency been changed? A small advertisement in this section will sell your old equipment and put you in touch with new machinery. 9-10

Engineer License Bills Progress

In Missouri, Senate Bill 11 to license architects, professional engineers and land surveyors has passed the state senate and is now before the house. In New Jersey, the license bill is out of committee and ready for second reading. In North Carolina, the bill introduced in the legislature at the instance of the North Carolina Assembly of the American Association of Engineers has been passed by the senate and house.

To License Builders in New Jersey

A bill introduced in the New Jersey legislature by Assemblyman Eldridge, of Union County, proposes to create a state board for licensing master builders in the various trades followed in the state. The board is to be named by the governor and to consist of an architect, a civil or mechanical engineer, a master builder and two journeymen, to serve without pay.

New Administrative Engineering Course at Union College

Union College, Schenectady, N.Y., has added a new course in administrative engineering designed for training managers and superintendents of industrial plants. The course covers a period of four years in which science comprises 26 per cent. of the total time; engineering, 39 per cent.; business administration, 10 per cent., and cultural studies, 25 per cent. The course includes studies in accounting, finance, banking, business law, contracts, and industrial management. It is designed for students more likely

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

Electrical Superintendent desires position; would consider a municipal hydro and waterworks connection, or an industrial plant electrical position; good references and can get results. Box 544, Electrical News, Toronto. 7-10

WANTED—Meter Men—Who are trained to fill responsible positions. Our course in meter engineering prepares you. Demand exceeds supply. Employment service free. Write for "Special Offer" today. Fort Wayne Correspondence School, Dept. A., Fort Wayne, Indiana. 8-7

WANTED—By the Truro Electric Light Commission, an electrical engineer to take the position of manager of municipal light and power steam plant equipped with turbine generators. Send references and credentials and name salary to W. K. Murray, Mayor and Chairman, Truro, N. S. 8-9

Wanted

Hydro-electric power house operators for high voltage power house operation. Must be familiar with operation of Lombard governors and Terrill regulators. Give details regarding experience, age, salary and references. Box 546, Electrical News, Toronto. 7-9

Wanted

Hydro-electric Power Superintendent and Maintenance Engineer on high voltage operation, also maintenance of D.C. and A.C. equipment. Familiar with operation of Lombard governors and Terrill regulators. Give details regarding experience, age, salary, references and enclose small photo. Apply Box 550, Electrical News, Toronto. 7-9

to be interested in manufacturing industries dependent upon engineering as a basis.

35,132 Students at Engineering Schools in 1920

Statistics collected by the Institute of Public Service, New York City, show that in 1920, 65 engineering colleges had a total of 35,132 students. In 1917 these colleges had 22,695 students and in 1914 21,419.

Dwight P. Robinson, Inc., 125 East 46th street, New York, engineers and contractors, announce the recent opening of branch offices in the Dominion Express building, Montreal, Canada, with Alexander C. Barker, vice-president, in charge. This firm has already done extensive construction and engineering work in Canada for the Canadian Pacific railway, Canadian Salt Co., Canadian Crocker-Wheeler Co., Dominion government, Aetna Explosives Co., and the Grand Trunk railway.

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-16

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker	
Used	1	100	3	25	550	710	Wagner	
"	1	75	3	25	550	480	Westg.	
"	1	60	3	25	550	750	Cr. Wh	
New	2	52	3	25	550	720	Lanc.	
Used	2	50	3	25	550	720	Westg.	
New	2	35	3	25	550	720	Westg.	
Used	1	30	3	25	550	1500	Tor & Hm	
"	2	30	3	25	550	750	F. M.	
Used	1	25	3	25	550	750	C. G. E.	
"	1	25	3	60	220	720	Cr. Wh	
New	1	25	3	25	550	715	Lanc.	
"	1	15	3	25	550	1450	Westg.	
"	1	15	3	25	550	750	Lincoln	
"	6	15	3	25	550	720	Westg.	
New	2	13	3	25	550	700	Lanc.	
"	2	10	3	25	550	720	Westg.	
Used	1	7 1/2	3	25	220	1500	Tor. & Hm.	
"	1	7 1/2	3	25	550	1450	C. G. E.	
New	1	7 1/2	3	25	550	725	Westg.	
Used	1	7 1/2	3	25	550	700	Lanc.	
Used	1	6 1/2	3	25	550	1440	Lanc.	
New	1	5 1/2	3	25	550	1440	Excelsior	
Used	1	5 1/2	3	25	550	1400	I. & M.	
Used	1	5 1/2	3	60	200	1120	Westg.	
New	1	5 1/2	3	25	550	710	Wagner	
New	3	3	3	25	550	1500	Lanc.	
"	5	3	3	25	550	1400	Westg.	
"	4	3	3	25	550	1400	Excelsior	
Used	1	2 1/2	1	60	110	1750	Wagner	
New	2	2 1/2	3	25	550	1440	Excelsior	
"	3	2 1/2	3	25	550	1425	Lanc.	
"	1	1 1/2	1	25	110	1420	Wagner	
Used	1	1	1	3	25	220	1500	Tor & Hm
New	1	1	1	1	25	110	1440	Wagner
"	1	1	1	3	25	550	1425	Lanc.

Write for Prices

H. W. PETRIE, Limited

131 Front St. West - Toronto, Ont.

The Information You Want When You Want it

We have collected a large volume of data on the electrical industry in Canada and the United States, and have arranged it in a convenient file, 4" x 6" manilla folders, each folder containing a list of firms with any known or other data for building and engineering projects. This was the first attempt at such a project.

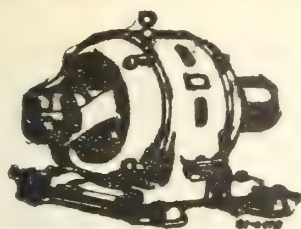
Building and Engineering

contains a list of firms, their names, addresses, and telephone numbers, and a list of their projects, with a brief description of the work, and a list of the firms which have been used for indicating the dates on which each project should be followed. In this way the engineer or architect can get the information he needs at once.

Write for full information
MacLean Building Reports, Ltd.,
345 Adelaide St. West, Toronto
Phone Ad. 778

MacLean Building Reports Limited

345 Adelaide St. W. - TORONTO
119 Board of Trade Bldg. - MONTREAL
348 Main St. - WINNIPEG
212 Winch Bldg. - VANCOUVER



Machines In Our Montreal Stock

We also have a quantity of new "Howell" Motors, from 1 H.P. to 100 H.P. and new "Kuhlman" Transformers from 1 K.V.A. to 1000 K.V.A. for delivery in approximately one to two weeks from receipt of order.

3 Phase 60 Cycle 2200 Volt.
1—300 H.P. 300 RPM. Slip Ring.
2—300 H.P. 490 RPM.
1—100 H.P. 600 RPM.
1—75 H.P. 1200 RPM.

3 Phase 60 Cycle 550 Volt.
2—200 H.P. 600 RPM. Slip Ring
1—100 H.P. 600 RPM.
2—75 H.P. 900 RPM.
1—50 H.P. 900 RPM. Slip Ring.
4—50 H.P. 900 RPM.
3—50 H.P. 1200 RPM.
2—40 H.P. 1200 RPM.
4—35 H.P. 1200 RPM.
4—35 H.P. 900 RPM.
1—35 H.P. 600 RPM.
3—30 H.P. 1200 RPM.
2—30 H.P. 900 RPM.
1—25 H.P. 900 RPM.
1—25 H.P. 1200 RPM.
1—20 H.P. 900 RPM.
2—15 H.P. 900 RPM.
1—15 H.P. 1200 RPM.
1—10 H.P. 1800 RPM.
2—10 H.P. 220 RPM.
1—7½ H.P. 900 RPM.
2—7½ H.P. 900 RPM.
1—8 H.P. 810 RPM. Crane
7—7½ H.P. 1200 RPM.
2—7½ H.P. 1800 RPM.
2—5 H.P. 900 RPM.

1—5 H.P. 1200 RPM.
11—5 H.P. 1800 RPM.
1—4 H.P. 1140 RPM. Crane
16—3 H.P. 1860 RPM.
12—3 H.P. 1200 RPM.
15—2 H.P. 1800 RPM.
14—2 H.P. 1200 RPM.

3 Phase 60 Cycle 220 Volt.
2—75 H.P. 900 RPM.
1—60 H.P. 900 RPM.
2—50 H.P. 900 RPM.
2—40 H.P. 900 RPM.
1—30 H.P. 1200 RPM.
1—25 H.P. 900 RPM.
1—20 H.P. 1200 RPM.
1—15 H.P. 1150 RPM. Slip Ring
1—12½ H.P. 1800 RPM.
2—10 H.P. 1800 RPM.
2—7½ H.P. 1750 RPM.
3—7½ H.P. 1200 RPM.
2—5 H.P. 900 RPM.
5—5 H.P. 1200 RPM.
1—2 H.P. 1200 RPM.
1—1½ H.P. 1800 RPM.

D. C. MOTORS & GENERATORS
1—40 H.P. 220 Volts.
1—35 H.P. 220 Volts.
1—17 H.P. 110 Volts.
1—8½ H.P. 125 Volts.
1—8 H.P. 120 Volts.
1—1¼ H.P. 220 Volts.
2—1½ H.P. 32 Volts.

Single Phase 60 Cycle 110 Volt.

1—7½ H.P. 1800 RPM.
5—5 H.P. 1800 RPM.
9—3 H.P. 1800 RPM.
11—2 H.P. 1800 RPM.
21—3¼ H.P. 1800 RPM.
21—1½ H.P. 1800 RPM.
13—1½ H.P. 1800 RPM.
12—1¼ H.P. 1800 RPM.
22—1½ H.P. 1800 RPM.
2—1½ H.P. 1200 RPM.
6—1½ H.P. 1800 RPM.
1—1½ H.P. 1200 RPM.

Single Phase 25 Cycle 110/220 Volts

1—1½ H.P. 1415 RPM.
2—1½ H.P. 1750 RPM.
2—1½ H.P. 1425 RPM.
1—1 H.P. 1420 RPM.
1—1 H.P. 1160 RPM.

TRANSFORMERS

1—40 K.V.A. 2200/110 Volts.
1—30 K.V.A. 2200/110 Volts.
2—25 K.V.A. 2200/550 Volts.
2—15 K.V.A. 2200/550 Volts.
5—10 K.V.A. 2200/550 Volts.
2—7 K.V.A. 2200/550 Volts.
5—5 K.V.A. 2200/550 Volts.
1—3 K.V.A. 2200/550 Volts.
2—6 K.V.A. 2200/110 Volts.

When in the market for Electric Power Apparatus, kindly communicate with us as we specialize in this line.

Electric Motor and Machinery Co., Limited 417 St. James St., Montreal, Que.
64 Wellington St. W., Toronto, Ont.

Motors in Stock

25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
1 10 hp. C.W. 750 rev., starter, rails, pulley.
1 5 hp. C.W. 1500 rev., starter, rails, pulley.
25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
1 13 hp. Lancash. 750 rev., starter, rails, pulley.
1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
1 20 hp. T.H.E. 1200 rev., pulley rails starter.
1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
1 16 hp. C. Wheeler 1800 rev., pulley, rails, starter.
60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
3 ½ hp. 1200 rev. clutch type T.H.E.
1 1 hp. 1800 rev. split phase Peerless.
1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
NEW SINGLE PHASE MOTORS in STOCK—REPULSION
2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
SPLIT PHASE
2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 ½ hp. Ohio 110 volt, 60 cycle, 1800 rev.
4 ½ hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited

HAMILTON

ONTARIO

Extra Opportunity

30 H.P. 3 phase, 60 cycle, 220 volts, 1200 R.P.M. complete with base, pulley and oil-immersed starter. Complete new wind, \$650.00.

10 H.P. 3 phase, 60 cycle, 220 volts, 1750 R.P.M. with base, pulley and oil-immersed starter, fully guaranteed, \$200.00.

850 gallon duplex fire dump, practically new, fully guaranteed, \$500.00.

100 H.P. Wheelock non-condensing engine with feed water heater, practically new, \$500.00.

64 H.P. H.R.T. boiler, 110 pds. with grates, etc., in perfect condition at \$500.00.

30 Kw. 2 phase, 60 cycle, 1200 volts or 600 volts, General Electric generator with exciter, good as new, \$650.00.

5 Kw. Westinghouse D.C. generator with rheostat, 600 R.P.M. generator practically new, \$250.00.

We also have a large assortment of new and used motors ¼ H.P. up to 50 H.P., both 25 and 60 cycle, all voltages at surprising prices.

New Westinghouse motors always on hand.

Industrial Engineering Company of Canada, Limited

Consulting Engineers—Electrical Equipment

28 Wellington Street West
TORONTO ONT.



TRANSFORMERS

Single Phase, 60 Cycle

Volts 550/220-110			Volts 2200/575			Volts 2200/220-110		
No.	Kva.	Make	No.	Kva.	Make	No.	Kva.	Make
6	1	West.	1	3	West	1	3	West.
1	5	"	1	7½	"	1	10	"
4	10	"	1	10	"	2	15	"
6	15	"	2	10	G. E.	3	15	Pittsbg.
7	20	"	3	15	West.	1	20	West.
6	30	"	3	37½	G. E.	6	25	"
			1	200	"	2	50	"
			3	250	West.	1	75	"
			6	600	"	2	100	"

MacGovern & Co., Inc., 285 Beaver Hall Hill, Montreal

Offices; New York, Pittsburgh, Seattle
Works at: Linden, N. J.
Buyers and Sellers of New and Used Machinery
A CONTINENT-WIDE SERVICE

We have available for immediate shipment approximately 250 motors, mostly 3 phase, 25 cycle, 220 and 550 volt.

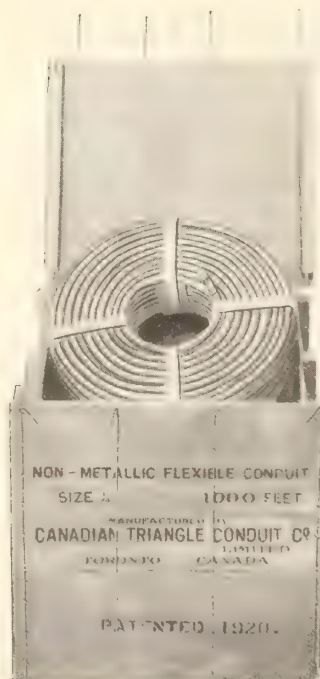
The following are a few of the bargains. We have many others equally attractive:—

Single Phase, 25 Cycle, 110 Volt.		
4	1/8 H.P. Menominee, 1400 RPM., new, each	\$ 32.50
2	1/4 H.P. St. Louis, 1400 RPM., new, each	40.00
3 Phase, 25 Cycle, 220 Volt.		
6	2 H.P. Crocker-Wheeler, 1500 RPM., new, each	170.00
4	3 H.P. Crocker-Wheeler, 1450 RPM., new, each	200.00
3	5 H.P. Crocker-Wheeler, 1450 RPM., new, each	235.00
2	5 H.P. Robbins-Meyers, 1450 RPM., used, each	185.00
6	7½ H.P. Crocker-Wheeler, 1450 RPM., new, each	420.00
1	7½ H.P. Westinghouse, 1450 RPM., new, each	420.00
2	15 H.P. Crocker-Wheeler, 725 RPM., new, each	625.00
All above 3 phase motors have base and pulley.		
7½ H.P. and up have approved starters.		
3 Phase, 25 Cycle, 550 Volt Motors without pulley, base or starter.		
43	1 H.P. Westinghouse, 1400 RPM., new, each	135.00
10	10 H.P. Westinghouse, 1400 RPM., new, each	290.00
30	15 H.P. Westinghouse, 1400 RPM., new, each	360.00
3 Phase, 25 Cycle, 550 Volt, with base, pulley and starter.		
3	7½ H.P. General Electric, 1500 RPM., used, each	385.00
3	10 H.P. General Electric, 1500 RPM., used, each	415.00
1	15 H.P. General Electric, 750 RPM., used, each	560.00
1	30 H.P. General Electric, 750 RPM., used, each	575.00
2	40 H.P. General Electric, 750 RPM., used, each	925.00
1	50 H.P. Westinghouse, 750 RPM., new, each	975.00
1	75 H.P. General Electric, 750 RPM., used, each	1275.00
1	100 H.P. General Electric, 750 RPM., used, each	1850.00
Miscellaneous Apparatus		
1	Wagner Rectifier Converter, 25 cycle, 220 volt, suitable for 2 moving picture machines	800.00
1	Motor Generator Battery Charging Set, 110 V., 25 cycle, A.C., 10 A., 30 V., D.C.	225.00

McNaughton-McKay Electric Co.
LIMITED

Telephone 4241

WINDSOR, ONTARIO



4-ONE-BOXES

"Packed and shipped as quality products should be"—This is how one of our customers (a manufacturer of electrical specialties) draws attention to the fact that their products are handled and delivered right. For efficiency, security and marked economy 4-ONE-BOXES are unequalled. We will design a crate or box for any manufacturer who is interested in lower costs. Get in touch with us.

Write Dept. E. for literature.

CANADIAN WIREBOUND BOXES LIMITED

1000 Gerrard Street East, TORONTO

SALES OFFICES AT HAMILTON AND MONTREAL

VERMONT ELECTRICAL SLATE

FOR SWITCHBOARDS,
PANELBOARDS, LIN-
ERS, ETC., IN PLAIN
AND MARINE BLACK
FINISH.

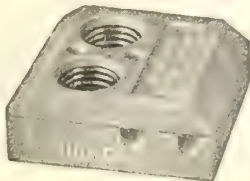
*Get in touch with
us for prices and
full information.*

HYDEVILLE SLATE WORKS
HYDEVILLE, VERMONT, U. S. A.

COVERED CUTOUTS

ALL PORCELAIN

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D. Pole
Single
Branch



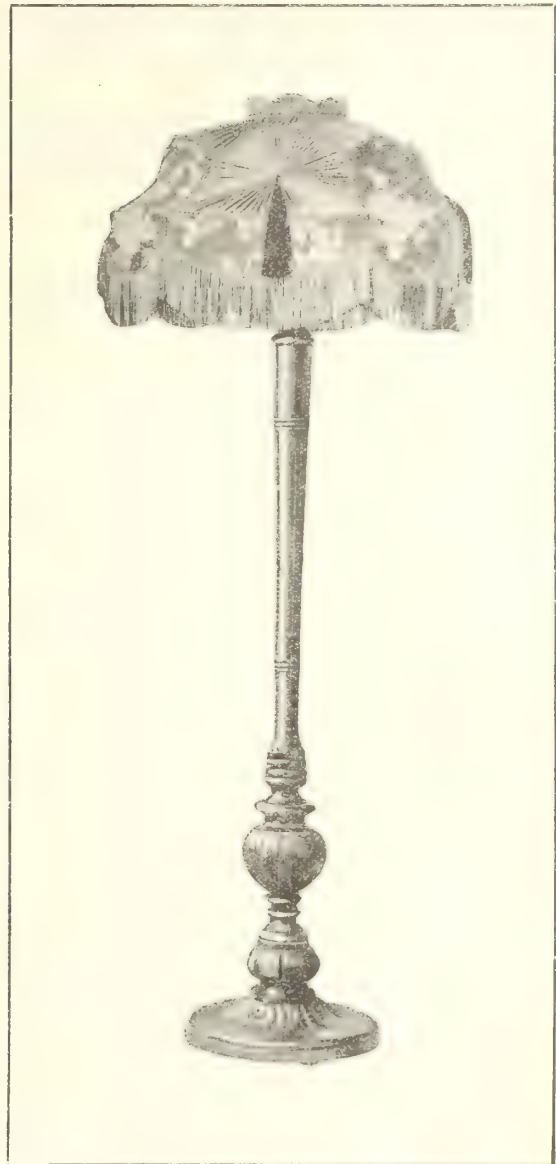
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MONTREAL, - CANADA

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Electric Lamps and Silk
Lamp Shades provides the
dealer with a wonderful ar-
ray of beautiful designs.

Baetz products have the hap-
py knack of selling them-
selves—to see, is to buy.

Write for Prices.

Baetz Bros. Specialty Co.
Limited

Kitchener

Ontario

HIGH EFFICIENCY

ON PEAK LOAD IS OBTAINED
WITH 'BUS-BARS AND CONNEC-
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THEY HAVE GREATER RADIAT-
ING SURFACE, LESS THAN HALF
THE WEIGHT AND COST LESS
THAN COPPER.

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ATTENTION! -Electrical Dealers-



OUR NEW BULLETIN IS NOW READY
— FOR DISTRIBUTION—TO YOU —
HUSTLING DEALERS MAKE GOOD PROFITS HAND-
LING THIS CLASS OF TELEPHONE EQUIPMENT.

Manufactured by
CENTURY TELEPHONE CONSTRUCTION CO.
BRIDGEBURG, ONT.



SAFETY FROST

Non-injurious to the skin, non-inflammable and
absolutely permanent.

Easy to apply—Simply dip into can and allow
excess to drip back for two minutes, and wash off
with water.

Is not affected by weather or heat of lamp. It is
on to stay.

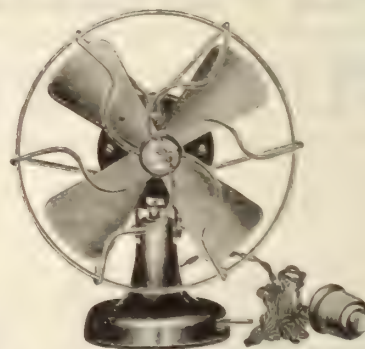
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Makers
TROY, N. Y.

Carried in Stock by

W. H. Hazlitt & Co., Ltd., Vancouver, B.C.
International Machinery & Supply Co., Ltd.,
421 St. James St., Montreal.

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Sells At Sight

The price is right, the demand will
be sharp as soon as the warm weath-
er arrives. Don't be without POL-
AR CUB.

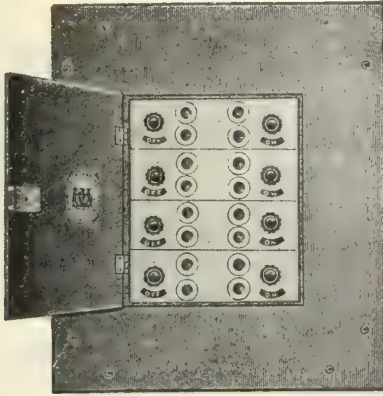
Order now and order enough.

Canadian Electrical Supply Co. Ltd.

Distributors

165 Craig Street West, Montreal

Quebec Branch: 128 St. Joseph Street



Panel Cut-Out Boxes With Gutter

*Examined and labelled under directions of
Hydro-Electric Power Commission of Ontario*

For use with plug cutouts and panel switches saving considerable over cost of panel boards. These boxes are formed of sheet steel and are electric welded at corners, with 3 inch gutter drilled for each connection on cutout. Holes are bushed with a brass eyelet. The door and trim are separate and fastened to box with machine screws so they can be removed for wiring. Doors are rabbeted on four sides and are equipped with Yale combination latch and lock with two keys.

Send for catalogue illustrating our complete line. We shall also be pleased to quote on commercial welding, japanning and metal stampings.

DOMINION ELECTRIC SWITCHBOX CO.
62 SUMACH STREET TORONTO, ONT.

CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

*Manufacturers of High and Low
Tension Porcelain Insulators*

High Power Storage Batteries

Powerful, Reliable, Efficient.

The Last Word in the Battery Art

A Battery
for Every Car
And Every
Battery
Guaranteed
For 2 Years

Manufactured By

THE MINIMAX ELECTRIC & MFG. CO., LTD.

LASALLE 1797



Made in Canada

We
Solicit
Your
Enquiry

Office and Works:

MAISONNEUVE. MONTREAL, QUE.

Has Outlasted 12 Sets of Ordinary Brushes

A big argument in favor of any commodity is its ability to last a long time.

NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

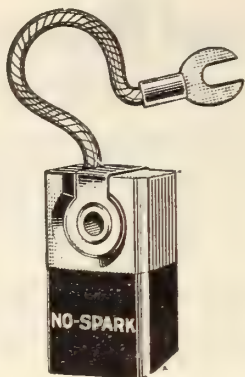
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

Send for our interesting bulletins.

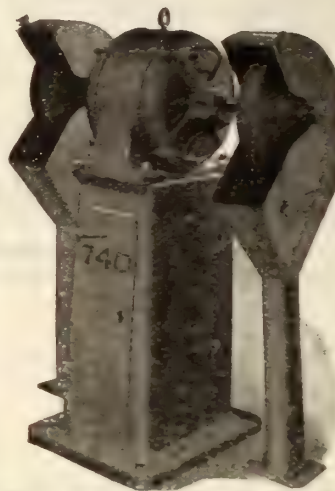
CALEBAUGH Self-Lubricating Carbon Co.

1503 Columbia Ave., PHILADELPHIA, PA.

Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



If You Need a Motor with Your Machine



Wagner Motor Driving Polishing
Wheels

and you want it to be as high in quality as the machine, specify

Wagner Quality

Wagner motors will help to sell your machine and make them dependable.

Send for Bulletins 11813 and 12213

Wagner Motors
are 40° Motors

Wagner Electric Manufacturing Company
of Canada Limited - Montreal

420 Power Bldg., Montreal.

183 George St., Toronto

3591

The Peirce Wireholder



No. 394

Write in for Sample and Prices.

N. Slater Company, Ltd., Successors to Slater & Barnard Limited **Hamilton, Ont.**

Made in Canada under Peirce and Hubbard Patents



STEEL Switch Block

better than wood
Fits Flush, saves time
and labour.

No More Broken Blocks

*For Sale by all leading
electrical jobbers or write
direct for samples*

LESTER ELECTRIC CO. LTD.
St. Thomas, Ontario

Tenders

A few dollars spent in advertising
your proposals in

The Contract Record

would result in additional competition
which might save your city or town or
your client many hundreds of dollars.



Triple-Inspected for Your Protection

Of course Oshkosh Tools are produced
from the finest wood, iron and steel. And
each must pass three rigid inspections be-
fore Oshkosh says "O.K."

OSH KOSH

CONSTRUCTION TOOLS

--properly balanced, no heavier than neces-
sary and always reliable. First choice of
big buyers and good workmen for over 40
years. More Oshkosh Construction Tools
are in use than any other make.

Your jobber can supply you.

OSHKOSH MFG. CO.

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Pike Poles Spoons Shovels Climbers Crowbars
Digging Bars Tamping Bars Pole Supports
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Dependable Machinery

Our turbines have stood
the test of time. Why
not investigate our pro-
position before making
a decision on the pur-
chase of power equip-
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A product from a mod-
ern and efficient plant
that renders satisfactory
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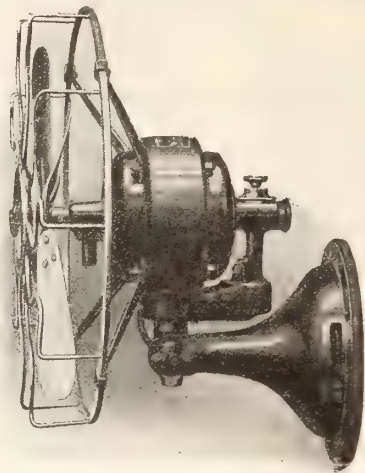


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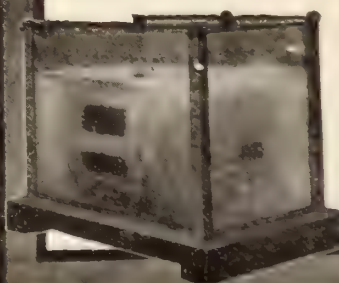
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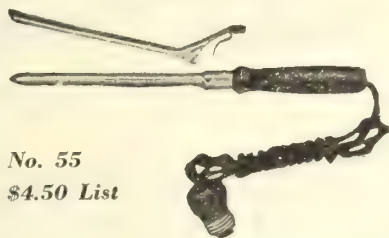
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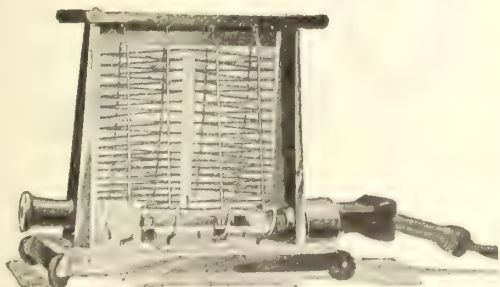
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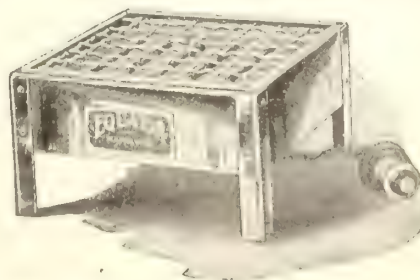
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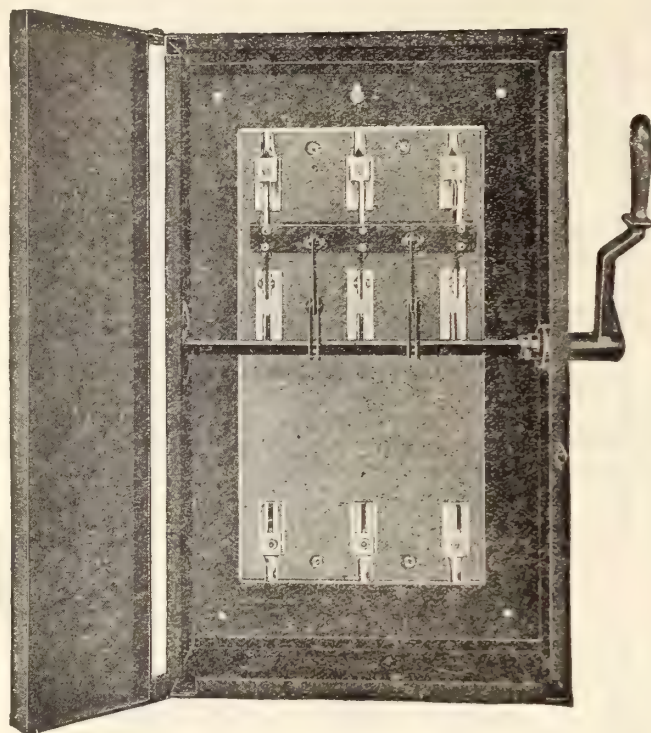
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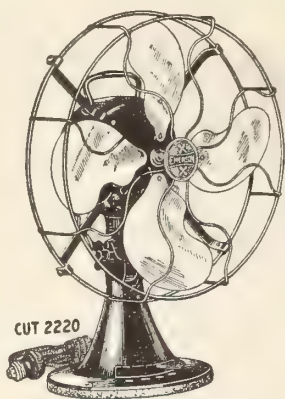
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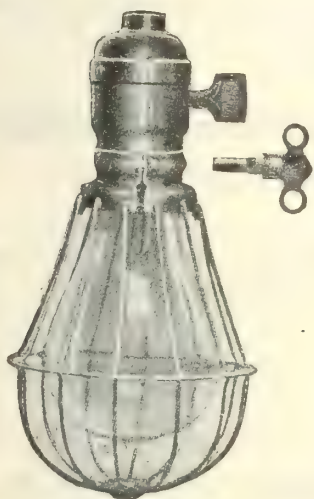
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"Theory and Calculation of Transient Electric Phenomena and Oscillations", by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.

The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.

The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1). Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.

The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 50c.

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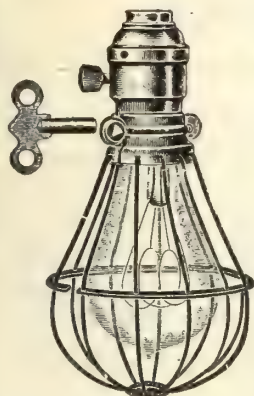
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Safeguarding the Lamp

From Theft or Breakage **LOXON** Does It!

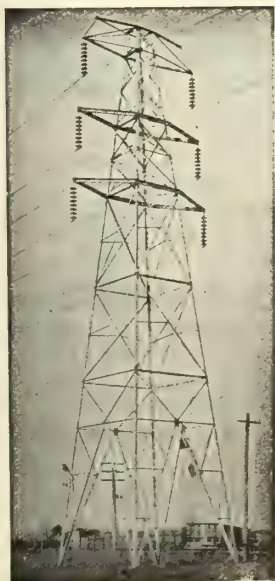
One turn of the key and the lamp can't come out. Loxon, the lamp guard, is popular all over America. It sells at a single price at a single glance.



Many other electrical specialties which will make money for you. Get in touch with us. Illustrated price lists free.

McGILL MANUFACTURING COMPANY, Valparaiso, Ind.

GALVANIZED STEEL TOWERS AND POLES



The modern means of supporting overhead wires.

Power Telephone and Trolley Lines

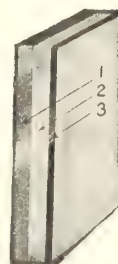
We shall be pleased to furnish designs and estimates upon request.

Standard Tower of the Hydro Electric Power Commission of Ontario

The Canadian Bridge Co., Limited
Walkerville, Ontario, Canada
Structural Steel of all Kinds
Montreal Office in New Birks Building.

BUY CELESTIALITE

NEXT TO DAYLIGHT



Three Layer Glass

- 1 Clear crystal to provide body and strength.
- 2 Translucent white glass to diffuse light evenly.
- 3 Rectifying layer of blue glass to eliminate excess red and yellow rays—producing a soft white light, near daylight.

No. 5920

Celestialite Glass produces perfect eye comfort. There is no glare. Colors shown to advantage.

Unexcelled for Schools, Offices, Stores, etc.

Made in many types and sizes.

Tallman Brass & Metal Limited
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MICA

Canadian Amber India Ruby

All forms of Mica Insulation.

Cut to size—Selected to Pattern—Segments.

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A complete stock of Clear Ruby Mica for Stove and other purposes.

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Double the Life of Your Pole Lines

By using our

OPEN TANK TREATED

British Columbia Cedar Poles

They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices. No obligation.

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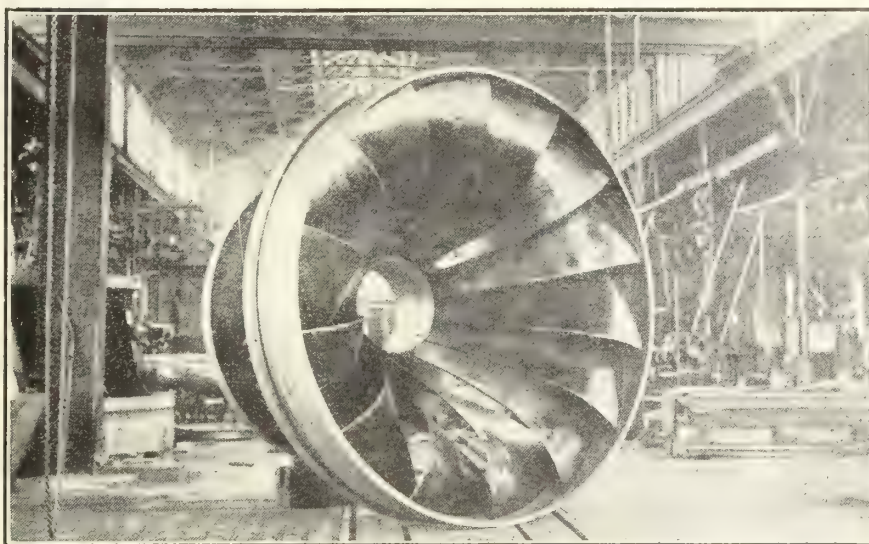
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**Water
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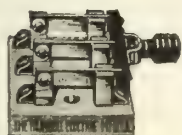
**High
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Construction**

**Continuous
Service**

BOVING HYDRAULIC & ENGINEERING CO., LIMITED
LINDSAY ONTARIO

International



! SPRING-TIME AT LAST !

Now, what about your supply of

COLUMBIAS?

No. 6 IGNITORS, MULTIPLES, HOT-SHOTS, and your stock of
regular, first-class

TRUMBULL BATTERY SWITCHES?

Phone, write or wire to

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BAKELITE DILECTO

In the Big Electrical Shops

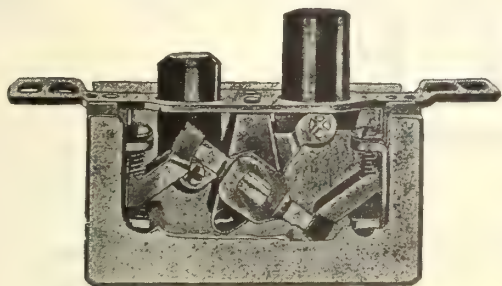
Bakelite Dilecto, the perfect insulation, is extensively used by large manufacturers of electrical equipment and its extreme physical properties also permit its use in mechanical applications. We manufacture Bakelite-Dilecto, Vulcanized Fibre and Continental Bakelite in sheets, rods, tubes and special shapes and Corite in sheets or rolls from .005" to .020" thick.

Canadian Agent: Frank T. Groome, 1710 Royal Bank Bldg
TORONTO

The Continental Fibre Co., Newark, Delaware

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San Francisco Office, 525 Market St.	Los Angeles Office, 411 S. Main St.	Canadian Office, Cor. King & Yonge Sts., Toronto, Ont.

THE New England Push Switch



Have You Seen Its Sales Possibilities Yet?

If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

Write or Phone our Canadian Agent:

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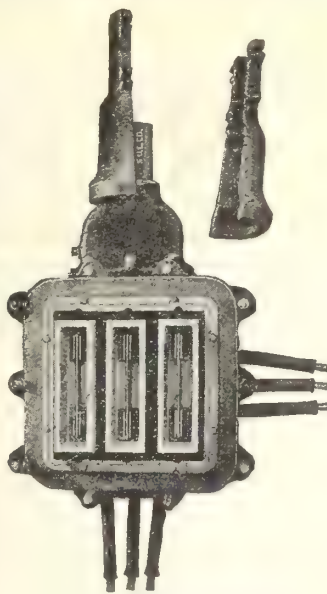
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Cor. King and Yonge Sts. TORONTO.

Phone Ad. 106

JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.

STANDARD Cable Junction Boxes



Type E-106, 2500-Volt
Cable Junction Box

insure economy in the installation and maintenance of electric cable systems, permit rapid disconnection of branch circuits and give absolute protection to the cable against moisture.

The box illustrated is a three-way sectionalizing box largely used in mines and designed for mounting on the wall of the mine shaft. The main line is connected solid through the box and the branch cable has the disconnecting feature.

The clamps which protect the lead nipple and enclose the armor wires of the cable and hold them in place are also shown in the illustration.

For detailed information write our nearest office.

**Standard Underground Cable Co.
of Canada, Limited**
Hamilton, Ont.

Montreal Toronto Winnipeg Seattle

Can You Afford?

to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine? Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.



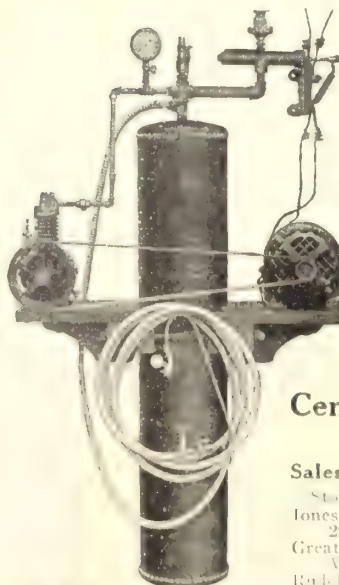
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Canadian Hykon Company
55 John St. South Hamilton, Ont.

FRACTIONAL HORSE POWER

Century

Repulsion Start Induction SINGLE PHASE MOTORS 1/10 to 1/4 H.P.



develop a static torque of not less than 350% of full load torque, which is particularly desirable for the operation of apparatus requiring an unusual effort at starting, for illustration Pumps, Compressors, Refrigerating Machines, etc.

Century Electric Co.
St. Louis, Mo.

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W., Vancouver, B.C.

1/2 H.P. motor mounted
on an Air Compressor
Other sizes up to 40
H.P.

SERVICE

Is the arch stone of the bridge of progress. It builds, and makes secure, all the elements of the structure.

Our service stations are our insurance and your assurance of the continued efficient performance of Westinghouse Apparatus. We are more keenly interested in Westinghouse Apparatus after it is in service than before it is sold.

Westinghouse experience as designers and builders of electrical apparatus of all kinds, assures intelligent and prompt repair service of the highest quality.

Westinghouse Repair Shops are conveniently located as follows:—

MONTREAL
10 St. Sophie Lane

WINNIPEG
158 Portage Avenue East

TORONTO
366 Adelaide Street West

CALGARY
316 Third Avenue East

VANCOUVER
1090 Mainland Street

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis Street.
CALGARY, Canada Life Bldg.
MONTREAL, 285 Beaver Hall Hill.



FORT WILLIAM, Cuthbertson Block
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WINNIPEG, 158 Portage Avenue E
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A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

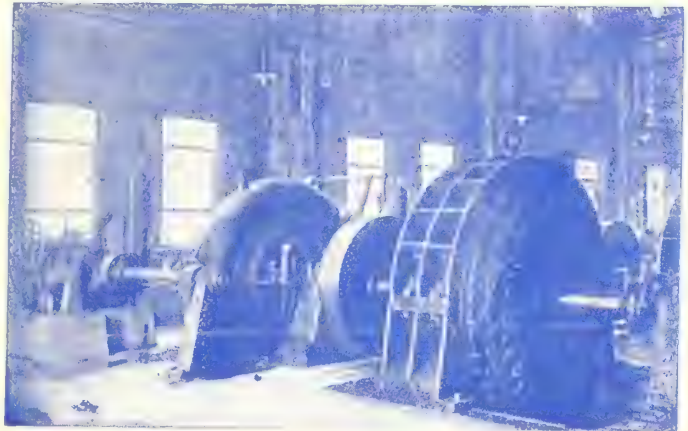
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

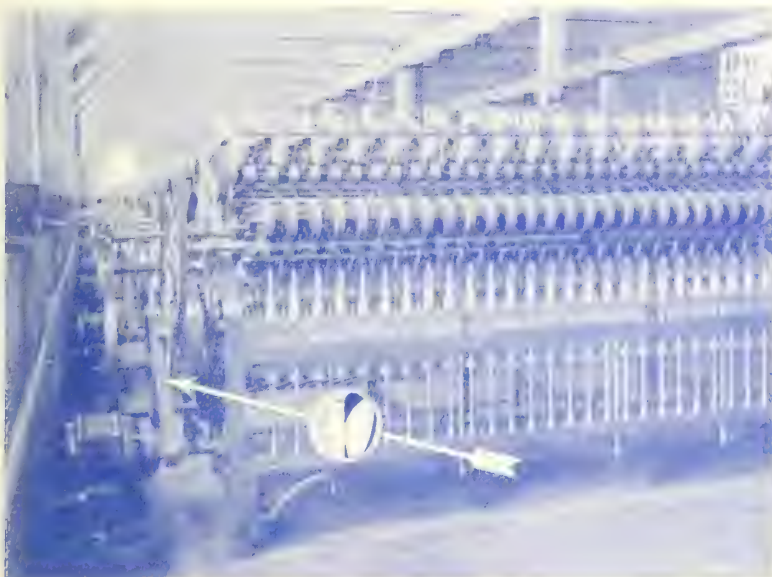
The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

MORSE SILENT CHAINS IN TEXTILE MILLS



Morse Silent Chains Driving from 5 H.P. Motor to Worsted Spinning Frames and Twisters

The Steady Pull perfects the product.

Clean—Runs Cool—Oil Baths not required.

Morse Drives are the time-keepers of production, bringing out the profits concealed by slipping belts. We have completely equipped several mills in Canada.

Write for Publications
Nos. 13 and 19.

Jones & Glassco, Reg'd
CANADIAN AGENTS

MONTREAL

TORONTO

USED ELECTRIC MOTORS

IN STOCK APRIL 24th

550 Volts 3 Phase 60 Cycle			
1 H.P.	1800 RPM.	Westg.	
3 "	1800 "	C.-Wheeler	
5 "	1800 "	A.C.B.	
5 "	1200 "	C.G.E.	
5 "	900 "	C.-Wheeler	
7 1/2 "	1800 "	Thomson	
7 1/2 "	1800 "	C.-Wheeler	
7 1/2 "	1200 "	Thomson	
7 1/2 "	1200 "	Ampere	
7 1/2 "	900 "	Westg.	
10 "	1800 "	C.G.E.	
10 "	900 "	C.-Wheeler	
15 "	1200 "	C.G.E.	

ALTERNATING CURRENT

15 "	1200 "	A.C.B.
20 "	1200 "	A.C.B.
20 "	1200 "	C.-Wheeler
25 "	1200 "	Westg.
25 "	900 "	C.G.E.
30 "	900 "	Fairbanks

550 Volts 3 Phase 60 Cycles

35 H.P.	900 RPM.	C.-Wheeler
50 "	900 "	A.C.B.
50 "	900 "	Westg.
75 "	900 "	Westg.
100 "	900 "	C.G.E.
300 "	720 "	Westg.

220 Volts 3 Phase 60 Cycle			
5 H.P.	1800 RPM.	Watson	
7 "	1800 "	A.C.B.	
10 "	1200 "	S.G.E.	
10 "	900 "	A.C.B.	
15 "	900 "	Westg.	
75 "	720 "	Westg.	
100 "	720 "	Fairbanks	

2200 Volts 3 Phase 60 Cycle

50 H.P.	1200 RPM.	A.C.B.
100 "	720 "	C.G.E.
200 "	514 "	C.-Wheeler

1—75 K.W. 2300 volts 60 cycles 3 phase 900 rpm. G.E. revolving field type generator.
1—250 K.W. 600 volt 60 cycle 2 phase 600 rpm. C.G.E. revolving field type generator

TRANSFORMERS

3—15 K.V.A. 2200-550 volts 60 cycle C.G.E.
2 30 K.V.A. 2200-220/110 volts 60 cycle Westg.
2—200 K.V.A. 2200-220/110 volts 60 cycle Packard

DIRECT CURRENT MOTORS AND GENERATORS

110 VOLTS

6 H.P.	1850 RPM.	C.G.E.
6 KW.	1465 "	Westg.
8 H.P.	1200 "	Union
10 "	700 "	G.E.
11 "	700 "	Westg.

220 VOLTS

20 H.P.	925 RPM.	C.G.E.
50 "	950 "	Westg.
50 "	925 "	Westg.
100 "	650 "	Bullock

500 VOLTS

10 H.P.	1000 "	M. A.C.B.
10 "	1400 "	C.G.E.
20 "	500 "	
25 "	750 "	Westg.
50 "	825 "	Union
100 "	600 "	Union

All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL



FOUR OF MANY

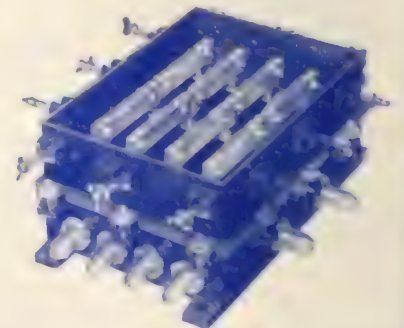
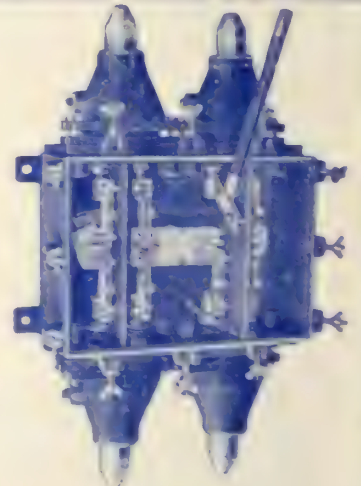
At the left a 6000 volt single conductor quillhead.
At the right, 2300 volt four way two conduct primary distribution box.

Lower right, bolted link type of box for D. C. net work junction.

Below, six way low tension distribution box designed for narrow wall space.

Each is only one of a complete range covering its class.

*New Bulletins (Potheads 211-
Boxes 212) now on the press*



G & W ELECTRIC SPECIALTY CO.

7440-52 So. Chicago Ave-

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A. H. Winter-Joyner, Ltd., 10 Cathcart Street Montreal.
Bentz-Richardson Co., Ltd., 592 Notre Dame Ave., Winnipeg.
General Supplies, Limited, Calgary and Edmonton.

Electrical

News

Engineering Contracting Merchandising Transportation



Single Phase
POWER
TRANSFORMER

Moloney TRANSFORMERS

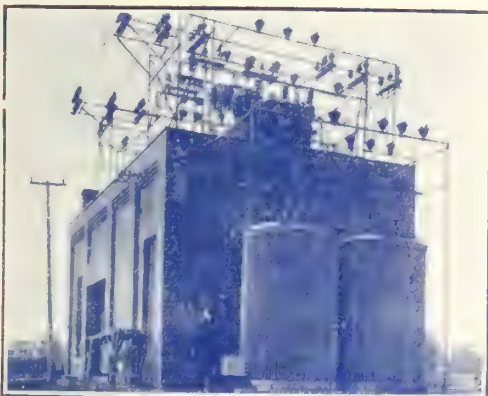
Moloney Transformers have long been famous for their absolute reliability under all conditions. This record of satisfactory service in the past will be maintained unbroken in the future.

Moloney Transformers are an entirely Canadian made product and we can give you prompt shipment. Full particulars on request.



3 Phase
POWER
TRANSFORMER

USED AND APPROVED FROM COAST TO COAST



Outdoor type
transformers.



Heavy duty fur-
nace type trans-
formers.

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.

District Offices

Factory

Head Sales Office

Montreal and Halifax Windsor, Ont. 1221-4 Bank of Hamilton Bldg. Toronto



The Torch Relay - B.C. 300

The Modern Method of Communication

Installing Northern Electric Paper Insulated, Lead-covered Telephone Cable in Ducts



The Beacon Signal - A.D. 1000

Largest Canadian Manufacturers of Bare and Insulated Wires and Cables

Northern Electric Company
LIMITED



The Smoke Signal - A.D. 1700

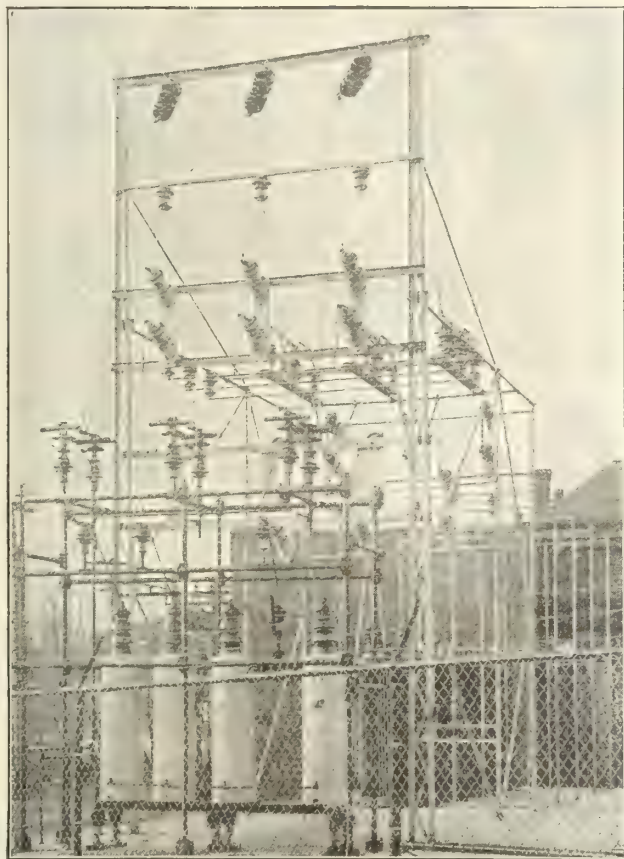
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HALIFAX	WINDSOR
QUEBEC	WINNIPEG
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TORONTO	CALGARY
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VANCOUVER	



The Pony Express - A.D. 1850



PROTECTIVE DEVICES



A typical Outdoor Sub-station, embodying Electrical Engineers Equipment Company Protective Devices

Exclusive "Three E" Features

Discharge Gap Lightning Arresters are essentially high speed with large capacity spheres having a ground resistance in series limiting the dynamic current to two amperes or less.

Disconnecting switches have contacts and blades arranged to always insure thorough contact without possibility of loosening after many operations. Simple operating mechanism provides powerful leverage when first breaking contact and greatly increased speed with reduced leverage, later.

Choke coils are well supported by patented Y-shaped clamps on ends and are further braced where necessary.

Our nearest house will give you full data and recommendations on these or any other "Three E" Protective Devices and Switchboard Fittings.

Northern Electric Company

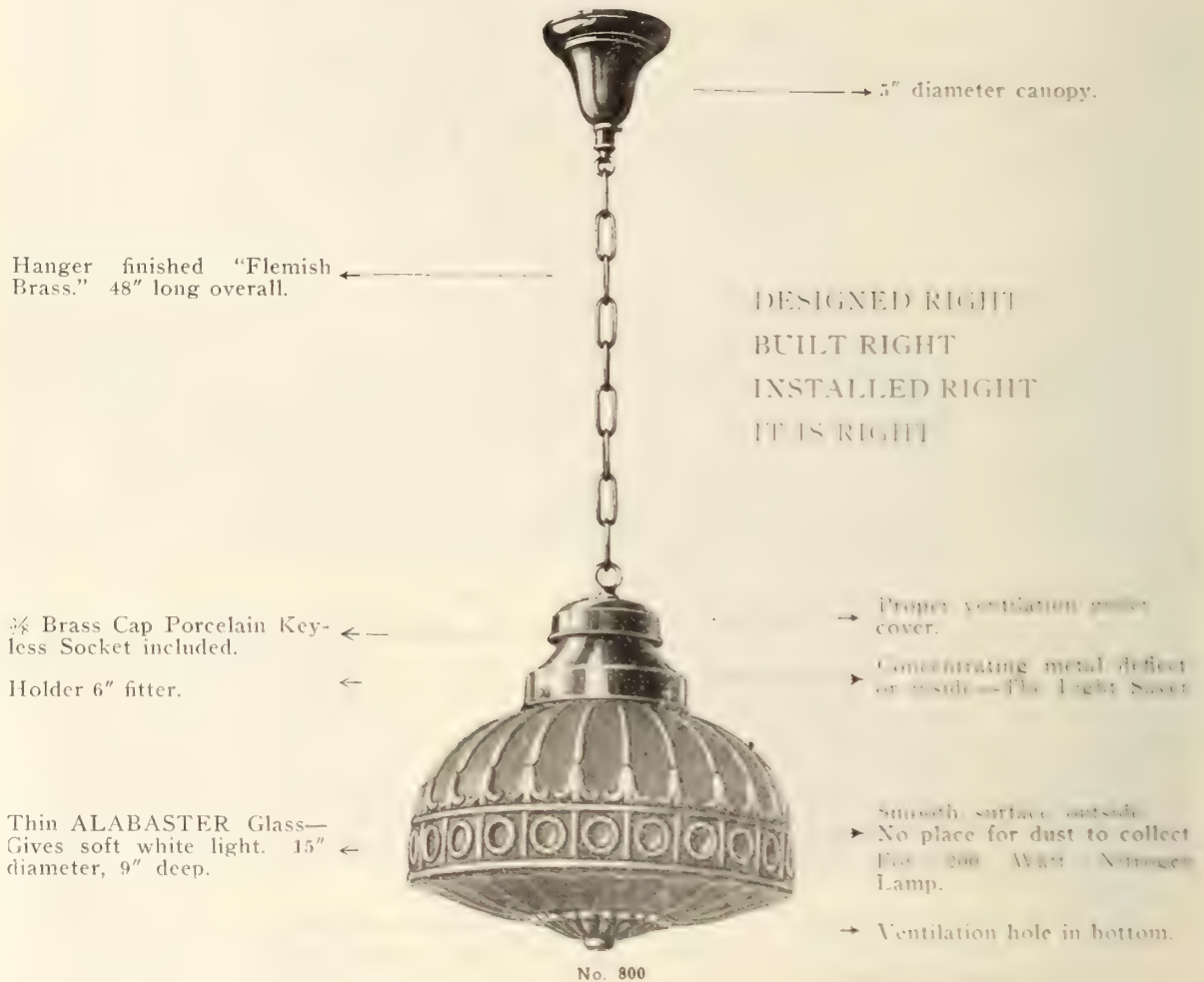
LIMITED

Montreal Quebec Toronto London Regina Edmonton
Halifax Ottawa Hamilton Windsor Winnipeg Calgary Vancouver

Announcing

A New Commercial Lighting Unit

CROWN-LITE



A ONE PIECE UNIT combining both Beauty and Efficiency.

Entirely enclosed—keeps clean.

The rays of light are directed downward over a wide area in a complete volume of intensity, without glare, producing best results.

WRITE FOR CIRCULAR

Hanger and Glassware made in Canada—By Canadians—For Canadians.

Crown Electrical Manufacturing Co., Ltd.

LIGHTING FIXTURES

Brantford - Ontario

The Best That Canada Makes



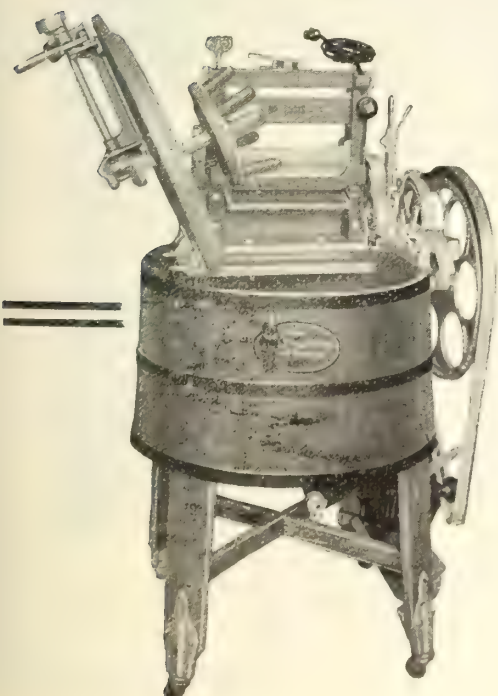
Link Your Store With Hundreds of Homes

EVERY time you place a Miss Simplicity you render a service which will develop business. Every member of the family becomes a regular customer, because of the happiness and pleasure in which they all share through Miss Simplicity. All friends of the family, too, will become live prospects for you.

The reason is simple. Miss Simplicity is an electric washer that fills a big need in the home. Built on liberal lines, made of the finest materials, mechanically perfect, and yet so simple, it appeals instantly and almost sells itself. The actual savings in laundry and doctor's bills made in a single year by Miss Simplicity will more than cover the cost.

This is profitable service to render customers because it creates good will upon which you can capitalize for years. Besides, Miss Simplicity gives you a handsome profit on every sale, while you are protected by our liberal guarantee with every machine.

Miss Simplicity offers the means to link your store with positively hundreds of homes—every home around you that is wired for electric light. Let us get together for better business. Send for our dealer proposition.



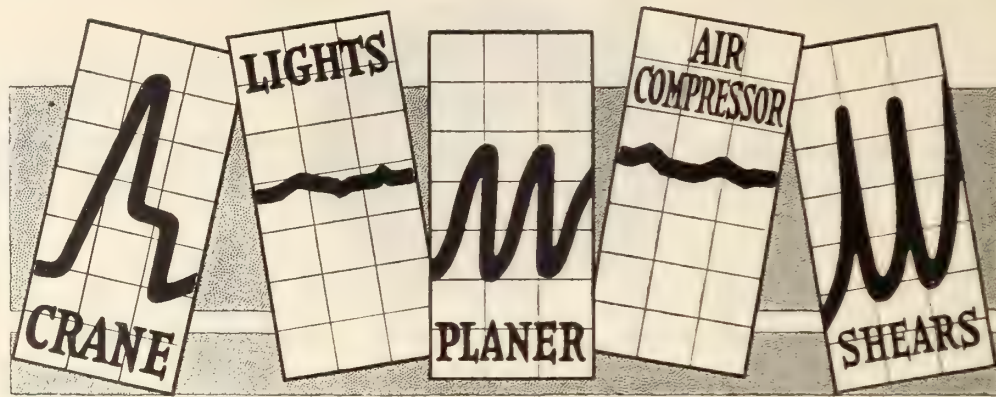
We are prepared to assist dealers with attractive advertising material. Full particulars will be sent with our offer.

W. A. KRIBS COMPANY LIMITED

Hespeler, Ontario

Western Distributors:
Great West Electric Company,
LIMITED
WINNIPEG, MAN.

Quebec Distributors:
Northern Electric Company,
LIMITED
MONTREAL, P.Q.



How Can You Estimate a DEMAND Like This?

Here are some load curves that might be taken from several machines in one plant.

If you are supplying current to such a plant, how can you estimate the DEMAND or figure the composite "load factor" of that plant? How can you **know** that such a plant is paying you its **just** share of your fixed charges?

It's impossible to **know** if you estimate. But, with a Lincoln Maximum Demand Meter on that firm's line, you can read the Demand just as accurately as you now read the kilowatt hour consumption.

Lincoln Demand Meters are accurate because of a simple thermal principle of operation. Regardless of where placed, they indicate the true maximum—with the new pointer device vibration does not effect them.

Write for information on the Lincoln Meter—there's no obligation in asking any question whatever. Let us explain how this Meter puts the billing of current wholly on a measured basis.

Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

Lincoln
MAXIMUM DEMAND
meter

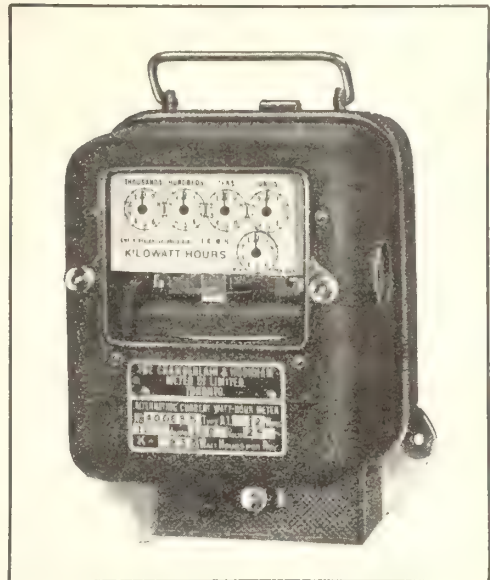


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

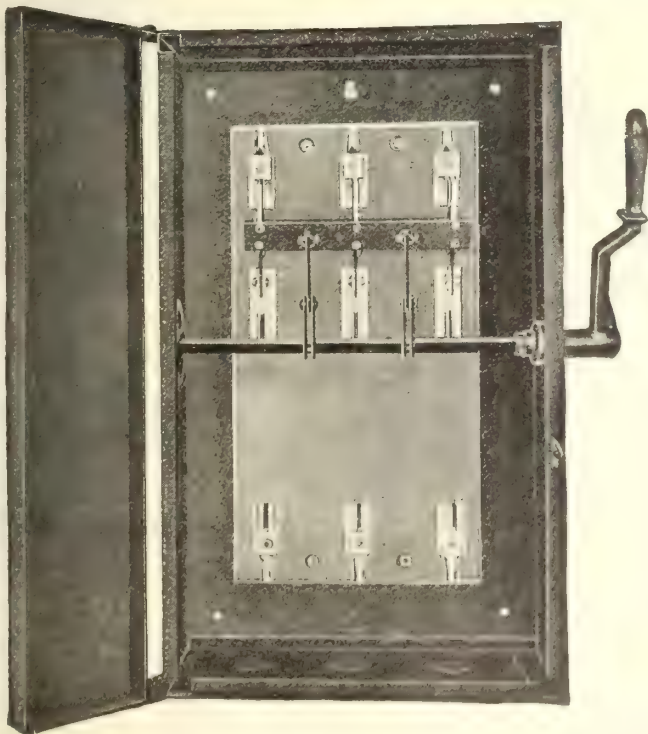
How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World



Are those Safety Switches you installed the last year or so, standing up?

WE GUARANTEE
Devoe Safety
Service Switches

Write for
Bulletin No. 19

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame St. West

Montreal, Que.



WE have undertaken to market the very finest Electric Washing Machine that we can. Aiding us in this work are our own ideals and every material factor essential to good manufacture. The men who have to do with the manufacture of BlueBird, with its sale, and, particularly those who possess a BlueBird, tell us our product is without an equal.

Certainly this is precisely the result for which we have strived.

**Are You, Mr. Dealer,
Cashing in on
BlueBird Sales?**

THE profits to be enjoyed in selling BlueBirds demands your interest. Lay your plans and cash in on this modern home necessity. Secure your BlueBird Sales license from your jobber—or communicate with us direct. Learn more of the advantages and possibilities for profit in your selling BlueBirds.

The "Colonial Maid"



is the finest Washing Machine built anywhere—and gives a lifetime of service. Built for Canadians by Canadians for Canadian homes.

You can market the BlueBird on a payment plan. A small cash payment, the balance in small weekly or monthly installments. Investigate our time payment method.

The BlueBird builds prestige and good will.

APPLIANCES

208 KING ST. W., LIMITED 233 PORTAGE AVE.,
TORONTO WINNIPEG

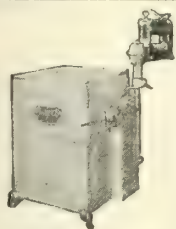


A B C

Sell a Complete Line Under One Famous Name!

At a retail price range from \$90.00 to \$225.00 there are A B C power washers, electric washers and electric ironers. A model to suit every purpose and purse! No need to tie up capital in several lines. No need to devote advertising space, time and energy to pushing more than one line. Reduce your investment, increase your turnover, lower your freight costs,

secure longer discounts, by confining your selling to the A B C Line. Note its broadness. Each model the leader in its class. Each bears the famous A B C name—backed by pioneers in the industry, the big, successful, twelve year old firm of Altorfer Bros. Company. Exclusive dealerships open. Write our nearest wholesale distributor, or us, for all particulars.



Some lift
and dip

Others rock
and toss

The ABC
does both

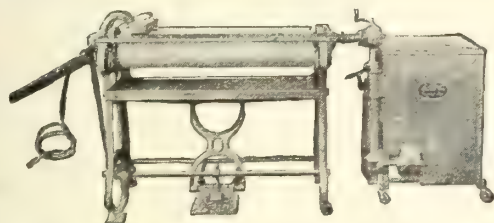
A B C Super Electric Washer

Open, semi-cabinet and full cabinet models. Maple or zinc cylinders. Copper or galvanized tubs. $\frac{1}{4}$ h.p. motor. Also equipped for power drive. Retail price range \$200.00 to \$225.00.



A B C Electric Ironer

Foot pedals apply and release ironing pressure. 45-inch roll and shoe. One-piece steel ironing roll; 8-inch diameter; 7-inch non-warping ironing shoe. Result: faster, uniform work. Shoe drops back 4 inches. Enclosed parts. Retail price, equipped to operate off any A B C electric washer, \$205.00. With motor, \$245.00.

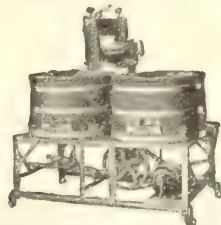
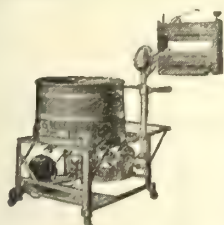


A B C Electric Laundress

*Washes - Wrings - Irons
With a Single Motor*

The only complete home laundry unit. Detachable wringer. Ironer shaft attaches to wringer post. Saves cost of extra motor.

The "Iron All" attachment superbly irons the difficult operations—ruffles, collars, cuffs, children's dresses, etc.



A B C "Alco" Washers

Dolly type. Underneath drive. Single or double tub. Oversize motor. Machine-cut gears insure absolute quietness of operation. Also furnished for power drive off gasoline engine. Retail prices, \$128.00 to \$175.00.

A Full Line Under One Famous Name—Investigate!

ALTORFER BROS. COMPANY, Pioneer Makers of Power Washers and Ironers

Factories and Executive Offices, Peoria, Illinois

C. D. HENDERSON, Canadian Representative, Box 123, BRANTFORD, ONT.

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N. S.
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Dawson & Co., Ltd., 148 McGill St.,
Montreal.

ONTARIO
The Central Electric Supply Co., Ltd., 36
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SASKATCHEWAN
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Rubber Covered Wires and Cables

FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

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**L
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**A Galvaduct Building
Bank of Nova Scotia at Hamilton, Ontario**

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you
—write us.

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg



“What Price Shall I Charge?”

How many times a day does this important question confront you? What prices should you charge for goods such as wire, condulets, conduit, sockets, etc., etc., that are sold over the counter or are taken out on jobs?

Everything Must Have a Price

Your success depends on what prices **you** get for your goods and services. It matters little how Large a Business you do—nor how many jobs you take from your competitor—nor how close a buyer you are.

Unless you procure the correct **retail selling price** (sufficient to cover cost of doing business and a reasonable profit) you are working your head off and not getting anywhere, and possibly the other fellow who is doing less work may be making a lot more money than yourself.

The Correct Retail Price

We are specialists in compiling suggested **RETAIL SELLING** prices for the Electric Contractor-Dealer. We have five people in our business who do nothing else but watch the markets and figure out what prices the Contractor should charge. We furnish you with a loose leaf price book containing suggested **RETAIL SELLING PRICES** on all standard Electrical Materials such as wire, conduit, condulets, sockets, switches, boxes, fuses, cutouts, loom wiremold and fittings, appliances, receptacles, etc., etc. Also other valuable information such as suggested charges for small repairs and house wiring rates per outlet.

Prices Always Up-to-date

No matter how often cost prices change your book is kept right-up-to-date. All you have to do is insert the change sheets in your booklet and you have at your finger tips at all times the **STANDARD RETAIL PRICE THAT IS BEING USED ALL OVER THE COUNTRY.**

Who We Are

Our directors are men actually engaged in the Electrical Appliance and Contracting Business. What effects you effects them also. We have made a close study of the cost of doing business and percentages of profits and we guarantee you a profit on every article leaving your place of business.

The cost of this wonderful time and money saving service is no more than you would spend each week for cigars. Our charges figure out about 70 cents per week (which includes a leather covered binder). Over 400 contractors use our service and within a few months we expect that fully 90% of the trade in the Dominion will be using it. It is worth the fees we charge if only to know what prices you **SHOULD** get.

Start now—We guarantee your profits.

The Henderson Business Service, Ltd.

Box 123

Bank of Toronto Building, Brantford, Ont.

Definite Records Prove the Reliability of O-B **MODERNIZED INSULATORS**

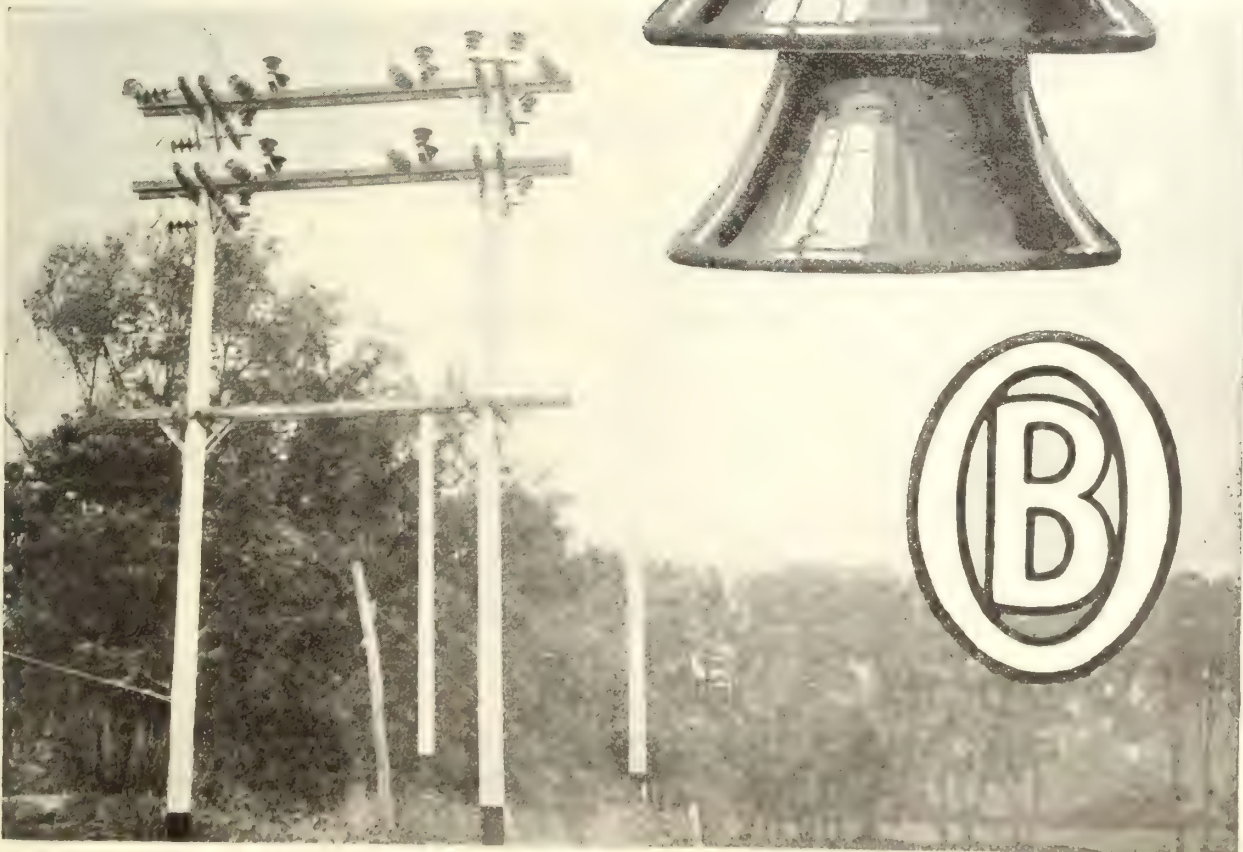
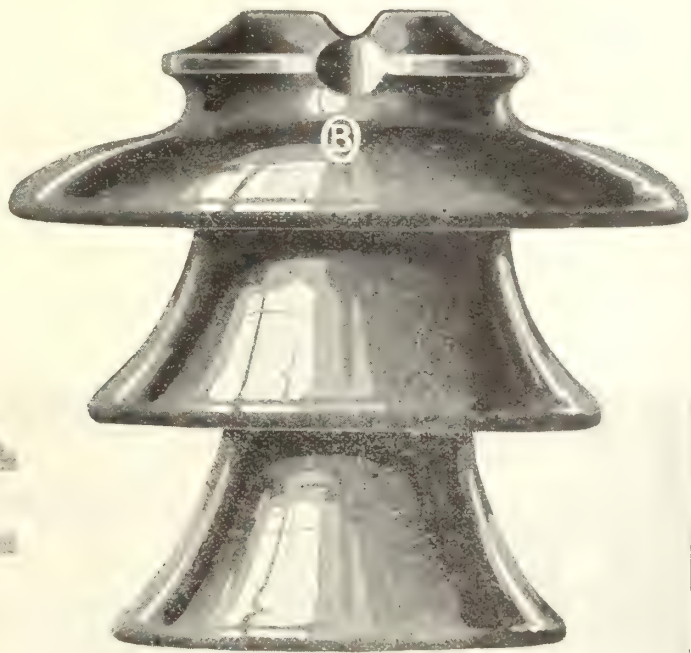
At first engineers bought O-B Modernized Insulators because in their opinion the theory was right and because the O-B organization stood behind them.

This judgment has been thoroughly justified.

The one infallible test of insulators—time on the line—has established remarkable records for O-B Insulators.

Your choice is complete. Deliveries are good.

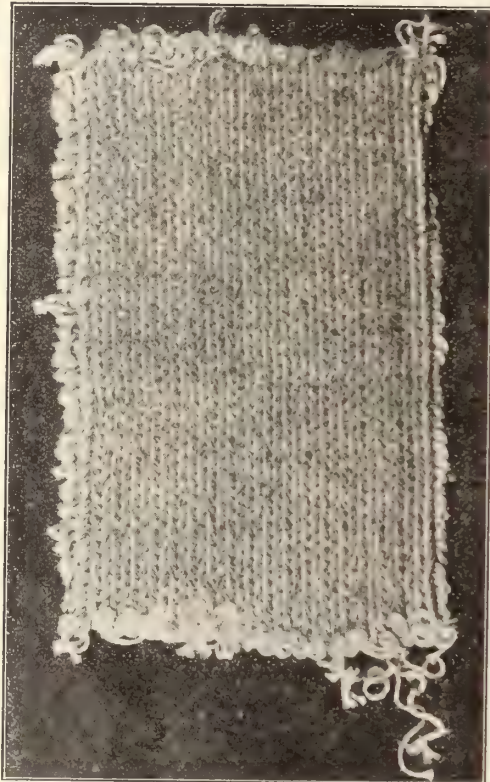
The Ohio Brass Co.
Mansfield, Ohio



"TRIDUCT"

*Single Wall, Non-Collapsible, Non-Metallic
Flexible Conduit*

MADE IN CANADA



Note the illustration of a piece of "TRIDUCT" previous to the saturating and finishing process.

The surface you see is the interior of the tube. Its rib-like and groove-like construction running parallel thus really assisting in the insertion of the wires.

"TRIDUCT", thru its entire process from start to finish, is manufactured and shipped as a quality product should be.



Triangle Products

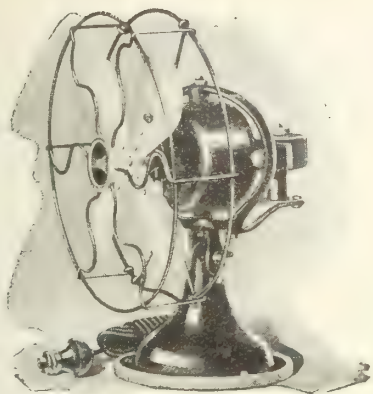
"TRICABLE"
"TRISTEEL"
"TRIDUCT"

"TRIHOSE"
"TRITUBE"
"TRICORD"

Have you received your copy of our new booklet describing the use, adaptability and economy of these Products? If not, please write for it.

Exclusive Selling Agents

Conduits Company, Limited
33 Labatt Ave. Toronto



One of the MENOMINEE line 9" oscillating, three speed, A. C. or D. C., any frequency from 25 to 60. Supplied wound for 110, 32 and 220 volts.

A New **MENOMINEE FAN**

With hot weather close at hand the demand for reliable fans will be great. The dealer who values his reputation and the good-will of his customers will sell Menominee Fans. They are sturdy, reliable, and quiet-running—the ideal fan for office, home and workshop.

Write for Full Particulars

R. E. T. PRINGLE, LIMITED

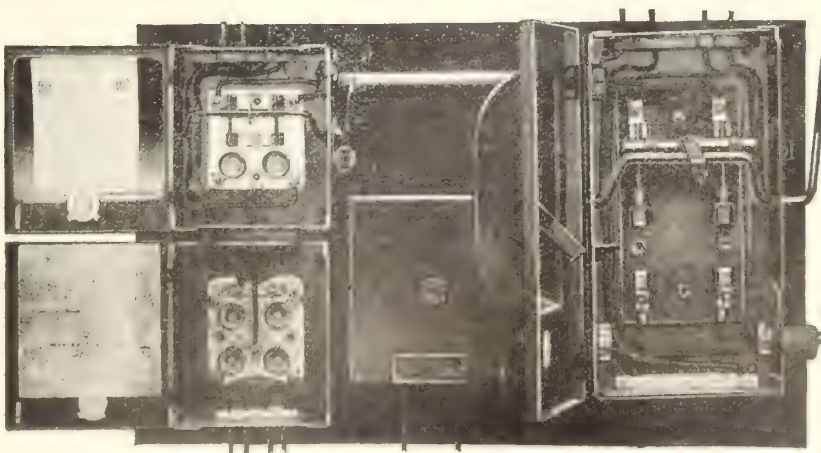
401 New Birks Bldg.
MONTREAL

95 King Street East
TORONTO

Vancouver Building
VANCOUVER

WE HAVE THEM FOR YOU Square "D" Safety Switches of every Description

This cut shows an installation we suggested and supplied to an apartment house in Montreal consisting of 104 apartments. We are at your disposal for any further information as to suggestions. Write or phone.



DISTRIBUTORS:

Canadian Electrical Supply Company, Limited

Branch:—165 Craig St. W., Montreal

28 St. Joseph St., Quebec, P.Q.

"FRANKLIN"

*the source of quality
and safety*

Install the
"FRANKLIN"
and forget it!

A slogan based on continuous satisfactory service of "FRANKLIN" Bus Supports, Disconnecting Switches, Pot-heads and other devices in the largest generating stations of the country.

ELECTRICAL
DEVELOPMENT
& MACHINE CO.
Philadelphia

Province of Quebec Number

THE Province of Quebec, electrically, occupies a somewhat unique position among the provinces of the Dominion. Possessing numerous water powers second only to Niagara, the work of developing and distributing the electrical energy has been undertaken almost entirely by private capital.

The history of these important developments, the carefully-devised plans for marketing the power, and the influence of electric power on the industrial growth of the province, constitute a story of unusual interest and significance. The publishers of the "Electrical News" will issue next month a

Special Quebec Number

in which will be presented illustrations, facts and figures designed to give the reader a unified conception of what the electric power enterprises mean to the province and of the possibilities of future development.

This number will be a compendium of information about the electrical developments of the province. It will be issued simultaneously with the annual convention of the Canadian Electrical Association to be held in the City of Quebec, and will offer a merchandising opportunity of exceptional merit.

Advertisers are requested to make early reservations of space in order that the publishers may be able to maintain the high standard of service which invariably means mutual satisfaction.



Electrical
News
Engineering Contracting Merchandising Transportation

Canadian-Made Motors

By buying your equipment in Canada you not only save duty and exchange rates but help to keep Canada prosperous. The "Gold Band" motor we manufacture cannot be exceeded by any imported makes, as regards efficiency, dependability and long life.

We carry spare parts for our motors to insure quick service. Used motors of all sizes also carried in stock.

Marchand Electrical Works Limited

55 COTE ST.

Phone Pl. 665-843

MONTREAL

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| <p>A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published in 1912 by Renouf Publishing Company. 248 pages, illustrated. Price \$1.50.</p> <p>Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price \$2.50.</p> <p>Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price \$2.50.</p> <p>Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, published in 1917 by McGraw-Hill Co., Inc. 285 pages, illustrated. Price \$2.50.</p> <p>Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price 50c.</p> <p>Electric Railway, by A. Morris Buck, M.E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated.</p> <p>"Engineering Electricity", by Ralph G. Hudson, S.B., 190 pages illustrated. Published in 1920 by the John Wiley & Sons, Incorporated. Price \$2.00.</p> <p>Examples in Alternating Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price \$1.50.</p> <p>Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price \$3.00.</p> <p>"How to Sell Electrical Labor-Saving Appliances", by Electrical Merchandising, first edition, 115 pages, illustrated. Published in 1918 by McGraw-Hill Book Company, Inc. Price \$1.00.</p> <p>Practical Electric Illumination, by Terrell Croft. First edition, published in 1917 by the McGraw-Hill Book Co. 225 pages, illustrated. Price \$2.00.</p> <p>Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price \$4.50.</p> | <p>Principles of Electrical Design—D.C. and A.C. Generators, by Alfred Sull. Published in 1916 by McGraw-Hill Book Co. 365 pages, illustrated. Price \$3.00.</p> <p>Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price \$2.00.</p> <p>Radiation, Light and Illumination, by Steinmetz. Published in 1909 by McGraw-Hill Book Company. 304 pages, illustrated. Price \$2.00.</p> <p>"Storage Batteries", by C. J. Hawkes, 157 pages, illustrated, published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.</p> <p>Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Published in 1917 by Longmans-Greene & Co. 102 pages. Price \$1.00.</p> <p>Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.</p> <p>"Theory and Calculation of Transient Electric Phenomena and Oscillations", by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.</p> <p>The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.</p> <p>The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.</p> <p>The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 50c.</p> |
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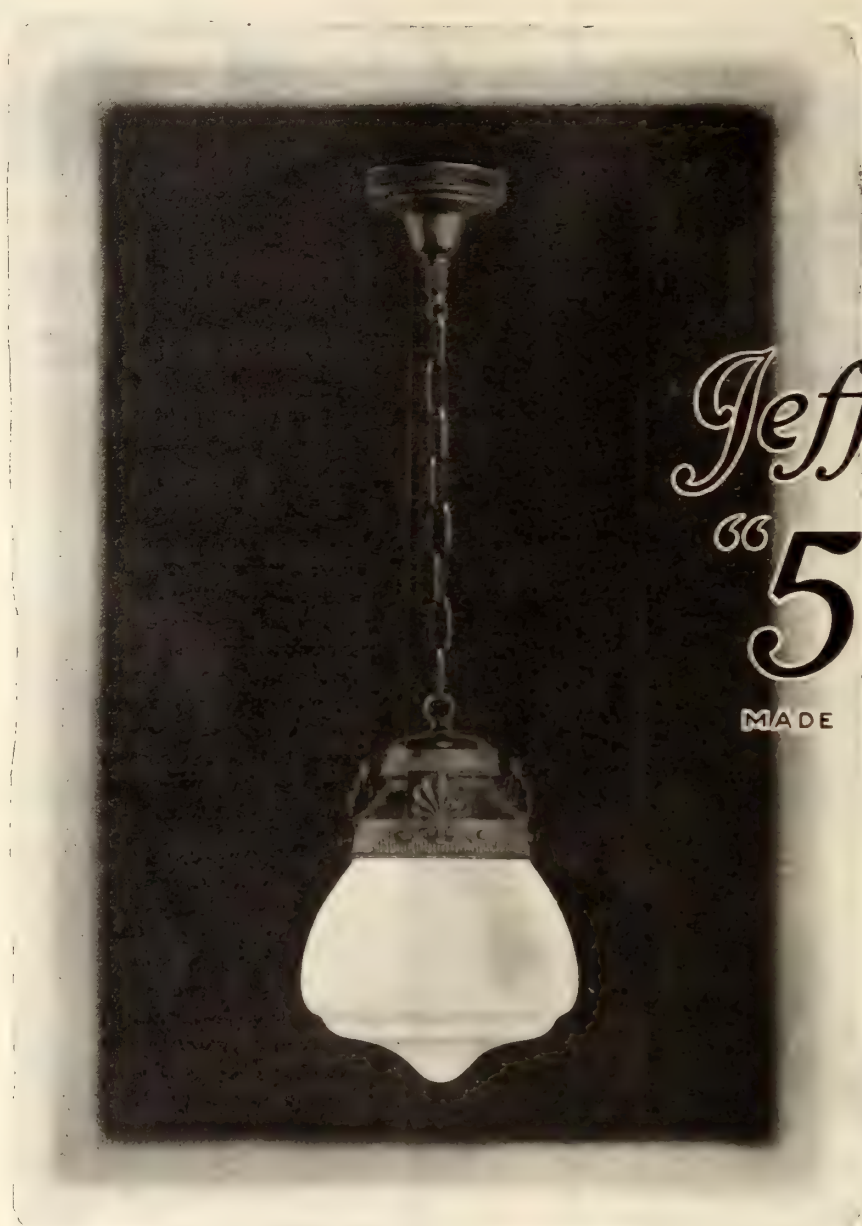
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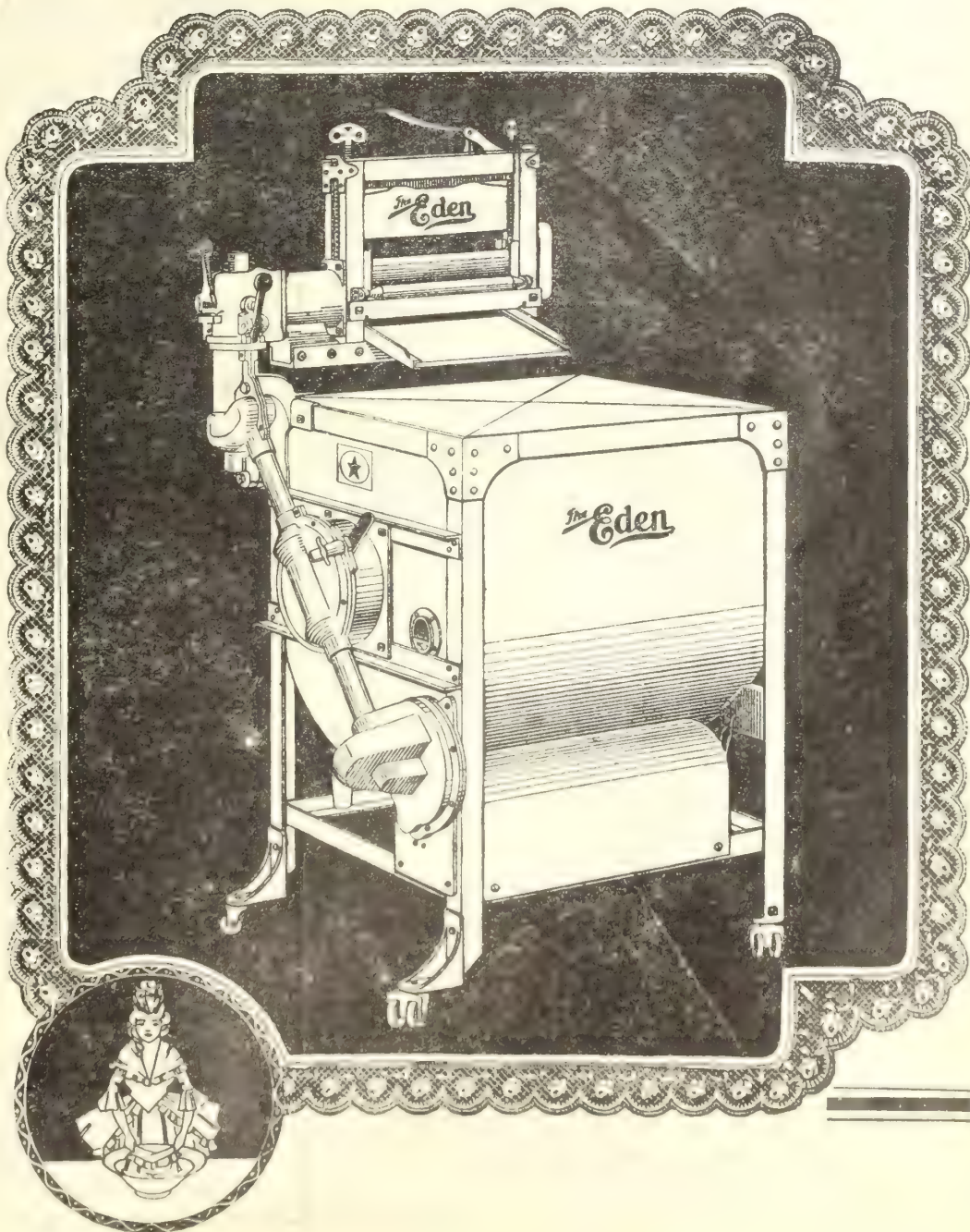
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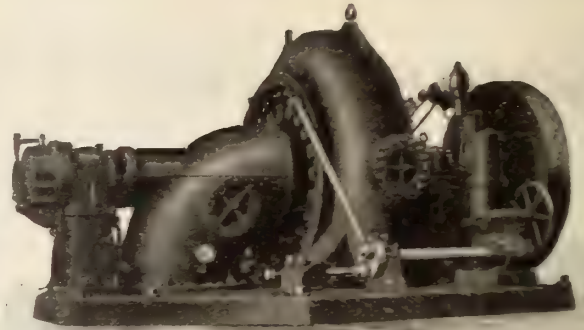
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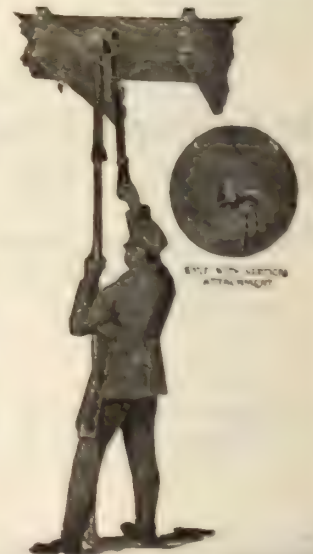
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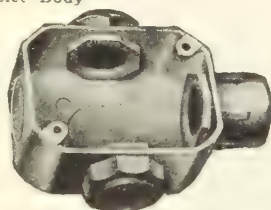
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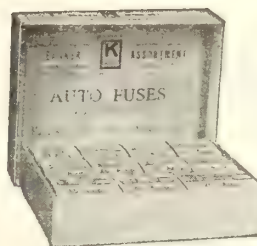
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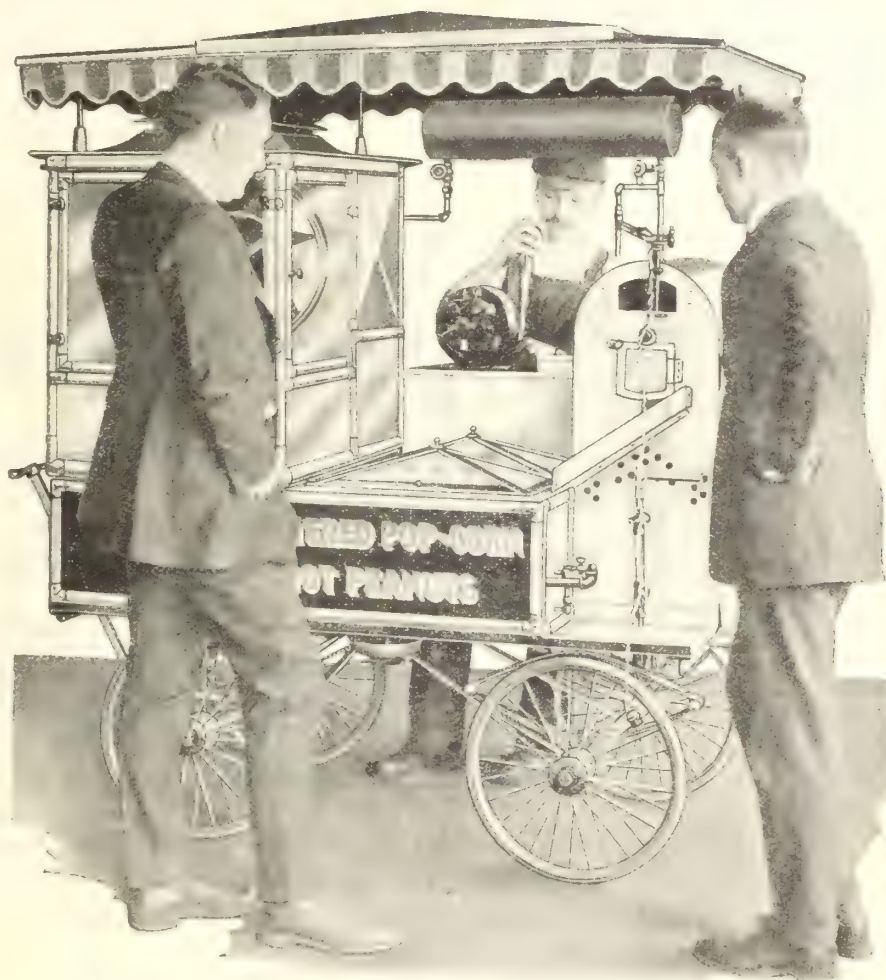
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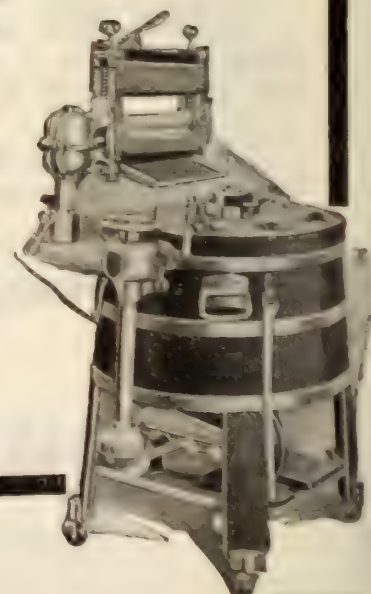
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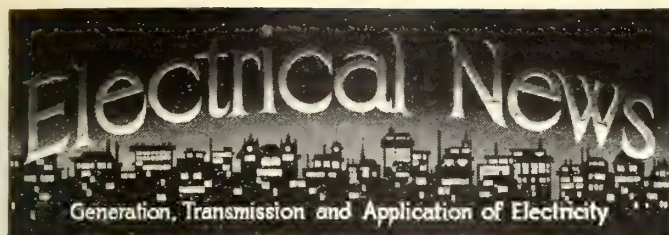
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Vol. 31

Toronto, May 15, 1921

No. 10

Hydro-at-Cost Not Favored by Farmer Government

The Ontario Assembly has seen fit to pass legislation which opens the way for a system of bonusing to certain municipalities where the cost of hydro-electric power distributed by the Ontario Hydro Commission is at present too high to justify its use. The bonus will take the form of financial assistance in building transmission lines and will apply first to those municipalities which are "just beyond" the limits of the present Hydro distribution radius. This will extend these limits a stage and, of course, introduce another area of "just beyonds." The demand would thus appear to be cumulative and to involve expenditures to which no definite limit can be fixed.

There are few people today who do not appreciate the value of electricity on the farm, and none who do not desire to see the home life of the rural communities attended with greater conveniences and luxuries. This act of the government, however, makes it necessary for us to revise our ideas of the meaning of the word "bonus." Usually it is something given to an individual or group so that benefit may accrue to a large number of other individuals. In this case it is something given to a small group at the expense of a large number of individuals, but no one of that large number of individuals stands to gain anything by the process—indeed, on the contrary, they all have to bear a certain and fixed share of the bonus without any attendant compensation.

Years ago when the Ontario Government was faced with the necessity of determining a policy with regard to our

water powers two courses were open—(1) to develop and distribute this power **at cost** to such of our citizens as cared to avail themselves of the offer or (2) to sell the power at the highest price obtainable on the market and place the profit to the credit of the taxpayers as a whole. It must be evident to the most superficial observer that the latter course is the most equitable and the only possible way of giving a little of the benefit of our water power resources to every one of our citizens. It involved certain conditions, however, which made the power-at-cost seem preferable. For example, it required selling, to the highest bidder, the right to develop and distribute, which almost certainly would have left these operations in the hands of private companies. For this and other reasons, after the most careful consideration, the then government decided on the principle of development and distribution to all and sundry at **actual cost**—this to apply, of course, not only to the districts situated close to the power supply but to every individual in the province if he cared to make use of it and found it to his advantage to do so.

* * *

It must have been just as evident to the electors in those days as it is today that this policy would necessarily be more advantageous to the areas lying nearer the source of supply. It must have been evident that the rates for electric energy would tend to increase as the radius widened and that a limit would finally be reached beyond which distribution could not go. This principle was, however, accepted as logical and reasonable—that nature has endowed certain districts more richly than others and that the individuals in those districts reap the benefits. This seems to be a principle, indeed, that is accepted the world over except among extreme Socialists. The fruit growers of the Niagara Peninsula, blessed with favorable climatic conditions, have never been asked to bonus the less fortunately situated farmers of, say, the Trent Valley district; nor have the wheat growers of the middle western provinces been asked to share their profits with the rural districts of the Maritime provinces simply because the latter are unfavorably situated for growing wheat; nor are the people of the extreme East and West of our Dominion being asked to pay a percentage of central Canada's coal bill. The principle of "local advantages" is recognized in hundreds of cases, and accepted without question as just and right. It was doubtless, to a considerable extent, on account of so many precedents that the same principle was accepted with regard to the distribution of power in the province of Ontario.

* * *

Why, then, make an exception to favor a few at the expense of the many? We do not ask the question in a critical way but in the hope that some answer may be forthcoming. Let us take a parallel case with reference to Canada's coal fields: the eastern end of Ontario, let us say, is "just beyond" the radius over which Nova Scotia coal can be economically distributed, yet no one has suggested that a fund be set aside to pay a percentage of eastern Ontario's coal bill. Such a suggestion would be met with ridicule and it seems no more unreasonable than bonusing a municipality that is not advantageously situated with regard to power.

To the writer it appears that the present Ontario government has made comparatively few mistakes—because they have based their operations, in the main, on sound principles. In this case, however, they seem to have been stampeded into doing something for the farmer partly because their sympathy lay in that direction; partly influenced also, perhaps, by that super-aggressive organ, the Farmers' Sun, whose enthusiasm for the cause it represents sometimes appears to get the better of its sense of right proportions. An illogical course has been adopted for the sake of benefitting a few individuals, and the policy of the province as regards its

water powers is again thrown into the melting pot. The provincial waterpower resources are no longer administered at cost, and the way is opened for pleas for special consideration from every conceivable source with the odds in favor of a repetition, in modern times, of the "old man and his ass" fable. Let us hope that a season of communing with nature will bring our farmer legislators back with a clearer vision of the cardinal points underlying the administration of a great public principle.

The Development of the Automatic Telephone

In a brief talk at the Montreal Electrical Co-operative Luncheon, on April 27, Mr. W. C. Adams, chief engineer of the Northern Electric Company, dealt mainly with the development of the automatic telephone. By means of diagrams and apparatus he described the method of ordinary telephone operation, and also the two automatic systems known as the Strowger step by step plan and the power driven panel type. The Canadian patents of the former are held by the Northern Electric Company. Each system, said Mr. Adams, has its own advantages. The failure of the earlier systems of automatic systems was due in a great measure to the complicated and clumsy nature of the apparatus.

Referring to other branches of electrical enterprise, Mr. Adams stated that his company had just sold to the Alberta Government telephone apparatus for installation between Edmonton and Calgary by which a number of conversations can be sent simultaneously over the same wire. The company had also put on to the market a telephone cable capable of containing 1,200 pairs of wires. So far little attention had been paid to wireless telephony, as it formed only a minute part of the big programme of linking up the various wire telephone systems; it was, however, hoped to make important developments in wireless telephony in the near future.

Replying to questions by Mr. D. M. Lincoln, of the Lincoln Meter Co., Toronto, Mr. H. J. Vennes, of the engineers' department of the Northern Electric Company, explained in detail how the conversations on such lines as between Edmonton and Calgary were carried on, and how—to use the description of Mr. Adams—they were "scrambled and unscrambled." At present, only four conversations could be carried on at the same time, although theoretically the system could be very largely extended.

Highest Developments in Art of Illumination

A meeting of the Toronto Section of the A.I.E.E. was held on April 28th in the Physics Building, University of Toronto, for the purpose of hearing Mr. W. D'Arcy Ryan, of the General Electric Company, Schenectady, N.Y., speak on "Illumination."

When introducing the speaker, the chairman of the meeting, Mr. F. R. Ewart, drew attention to the fact that Mr. Ryan was a native-born Canadian, was responsible for the organization of the Illuminating Engineering Society and had achieved a great success in the lighting of the Panama Pacific Exposition.

Mr. Ryan opened his address with a short history of the science of illumination, and explained that the slides which were to be exhibited (about 300 in number) dealt with, respectively, the history of illumination, the lighting of the Panama Pacific Exposition, and pageant and spectacular lighting.

The first slides shown dealt with early ways of producing light. These were followed by a series illustrating the development of lamps and candlesticks. All periods and ages were dealt with, and the audience was able to compare the crude magnificence of the gold lamp of Callimachus with the most artistic products of the period of Louis XVI.

The invention of gas marked a new era in lighting, and various stages of the early development of the industry, beginning with Murdock's street lamps in 1792, were illustrated.

Some idea of the magnificent lighting which featured the Panama-Pacific Exposition was furnished the audience by a large number of slides which probably surpassed in beauty anything previously shown before the Institute. The lecturer explained that about 9,000,000 square feet were illuminated at a cost of \$1,200,000—almost all known modern methods of electric lighting were employed, and co-operation between the architects and engineers had characterized the construction. The Court of Honor, Tower of Jewels, and other well-known exposition buildings were shown by slides which gave every detail of architecture and color. The slides had been made from photographs, taken at night for the most part, with the sole aid of the illumination furnished the buildings. Perhaps the highest development of illumination shown was that achieved in the Palace of Fine Arts,—the lighting units were themselves concealed, but the arrangement was such that wonderful depth and softness was secured.

Pageant and spectacular lighting was next dealt with, and various triumphal arches and spectacular effects were shown. Mr. Ryan remarked that electrical fireworks displays are displacing the old type and, in reply to a question by Mr. P. W. Ellis, chairman of the Toronto Hydro & Transportation Commissions, said that a display for Toronto Exhibition could be furnished at a relatively small cost.

Will Insure Against Motor and Transformer Breakdown

A rather unique development in the electrical business, and certainly an interesting one, has been brought to the attention by the Royal Indemnity Co. This development is in the form of an insurance covering the break-down of electric motors and other power equipment. The policy issued by this company is of a very broad nature and covers practically any break-down of any kind. It seems extremely simple, not hedged about by arbitrary clauses, and such that the layman can readily understand it. It takes the form, primarily, of a co-operative effort between the owner of the equipment and the company. By far the greater number of power users are, strictly speaking, ignorant of the underlying principles governing correct maintenance of electrical equipment. And this company undertakes to make periodic inspections. Advice is also given the insured relating to the proper uses of the equipment, and in the event of breakdown due to almost any cause, the insured is protected against the cost of repairs and replacement.

In view of the ever-widening use of electric power, reaching far beyond the economic operations of motor repair companies, the service rendered by this company should fill a very real need and be largely used. It is interesting to note that the company is preparing to write policies covering transformers of practically every type. It would appear that among others, municipal engineers throughout the Dominion would find it to their advantage to advise their customers to make use of this service, thereby relieving themselves of petty responsibilities.

The Royal Indemnity Company have their Ontario office at Wellington St., East, Toronto. The electrical department in the Toronto district is in charge of Mr. E. B. McBryde, who will be pleased to submit particulars to all who may be interested in this proposition.

The Swedish General Electric Co. recently closed a contract with the Hydro-electric Power Commission of Ontario for a motor-generator set of 150 kw. capacity to be installed in the Chippewa power house at Queenston Heights.

Encourage Empire Trade

**Harry Whitla, K.C., of Winnipeg, Speaks
to Manitoba Electrical Association
and Gives Facts on Buying
British Made Goods**

On Thursday, April 28th, the Manitoba Electrical Association had the pleasure of listening to a very interesting address, delivered at their fortnightly luncheon, by Harry Whitla, K.C.

Speaking on the subject of preferential Empire Trade and from figures at his disposal, Mr. Whitla said that Canada was not buying goods from the United Kingdom at the increasing rate foreign countries were doing. "There may be some classes of goods the United Kingdom cannot furnish as quickly or cheaply as before the war," said Mr. Whitla, "but if England can, as she does, show an increase in her trade every year and foreign countries are buying from her in every-increasing quantities, why not the rest of the Empire? If England's goods are good enough for others they ought to be good enough for us."

The speaker advocated that all members of the Empire work in unison to develop not only their own trade, but that of the different nations of the Empire, as distinguished from foreign countries.

In the year 1919, the United States had established a balance of exports over imports of practically four billions of dollars, which was equivalent to a trade profit in one year of one-tenth the total national debt of Great Britain. In 1913, the year before the war, 33 per cent of the total imports of the United States were furnished by the British Empire, and about the same volume was sold in 1919.

Of her exports in 1913 the States sent 46 per cent to the Empire, but in 1919 this had dropped to 40 per cent, which indicated that the United States had each year to buy at least 35 per cent of her imports from the British Empire and that the Empire had been able to greatly increase her trade while at the same time purchasing less from the States.

In the five years during and after the war, Britain's exports to foreign countries increased 150 per cent, but to British possessions only 38 per cent, which was conclusive proof that members of the Empire family were not purchasing of the Mother Country at the same rate as were foreign countries.

Canada's Trade

"So far as Canada's trade is concerned," remarked Mr. Whitla, "our total imports for the year ending March 1920, were considerably over one billion dollars, while our exports were nearly one billion, 300 million dollars. In the year 1920 we sold the Empire 44 per cent of our exports but only bought within the Empire 16 per cent of our imports. That same year we sold the United States 38 per cent of our exports but bought of her 75 per cent of our imports. In other words, in the year just closed we bought from the United States nine hundred and thirty million dollars worth of goods and we paid her in exchange alone the enormous sum of 100 million dollars, enough to pay the total interest of our national debt."

"It is this that makes the heavy exchange rate against us. The solution is to reverse the figures and sell more to our neighbors to the South and buy more within the Empire. Only in this way shall we hope to equalize the exchange and so make our Canadian dollar worth its full 100 cents."

What Canada Buys

Canada buys most largely of the following goods in their order: Fibres and textile products, iron and its products,

vegetable products (except wood and chemicals), non-metallic products. For the nine months ending December, we bought of these last named products, which include coal, petroleum, etc., from the United States, nearly one hundred and fifty million dollars worth, but from within the Empire we bought only 7½ millions.

The main articles exported by Great Britain as distinguished from the rest of the Empire and goods which we might have bought from her are in their order of value, cotton and woolen yarns and the manufactures thereof, machinery metals, linen, apparel, soap, electrical goods and jute manufactures. In this connection, since Canada's heaviest purchases are cotton and textiles, it is as well to note that England still holds the supremacy of the world in the cotton trade.

Quoting from a speech by Sir Charles Macara, the main authority on the cotton trade in the United Kingdom, Mr. Whitla said, "The man in the street may think America is a bigger factor in the cotton industry than England because she consumes in weight more raw materials, but America has only half the number of Britain's spindles, which number 60 millions. America has only been able to export five per cent of her cotton manufactures, although she produces five-eighths of the cotton crop of the world."

"The ultimate values depend upon the amount of machinery used, the labor employed, and the number and delicacy of processes, and in these respects our cotton industry leads the world."

"In connection with woollens, which form a large proportion of Canada's imports, Great Britain has 50 per cent more worsted spindles than the United States, and 40 per cent more looms, while in the matter of prices Britain and America are practically on the same basis, though for fancy worsted and wools the English price is much below that of America."

"It would appear, therefore," concluded Mr. Whitla, "that the purchase by us of these enormous quantities of goods from the States is merely a matter of choice, since in respect to price we might obtain just as advantageously in the United Kingdom, the same quantity and apparently a higher quality. Self interest joins hands with duty and the door is open for our entry into increased and remunerative trade within the Empire."

"It is necessary if we are to maintain our proper balance, to divert trade from foreign countries to the members of the Empire."

This Canada is seeking to do by admitting the products of other British possessions at one half the duty she imposes on like products from other countries, but this is not enough. The people of Canada must buy Made-in-Canada products or failing this, Made-in-the-British-Empire goods.

Letter to the Editor

Winnipeg, Canada, 6th May, 1921.

Editor, Electrical News:

I notice in your 1st May issue an article on the power development in Montreal district, in which the statement is made that Montreal leads all other cities on the American Continent in the amount of power consumed per capita per year.

In justice to Winnipeg I would draw your attention to an article by Mr. J. B. Challies, Director of Water Power, Dominion of Canada, published in the Electrical World, New York, on 23rd April, in which the statement is made that the consumption per capita in Winnipeg is 823 kw. hours per annum, which, as you will note, is over 9% more than Montreal.

Yours truly,

E. V. Caton, Chief Engineer.



Panoramic view of hydro-electric plant at Weedon, P.Q., under construction.

Hydro-Electric Plant at Weedon, P.Q., for City of Sherbrooke

The city of Sherbrooke is building a third hydro-electric plant at Weedon, P.Q., on the St. Francis River, which will develop 4,000 h.p. and deliver energy at 50,000 volts to Sherbrooke along a transmission line 28 miles long. The city has at present in operation a plant at Rock Forest, which, with another at Sherbrooke, develops 6,000 h.p. With two additional plants under consideration, the total power available for the city of Sherbrooke in the near future will amount to 20,000 h.p.

In 1917 the city of Sherbrooke bought the site of the Weedon dam from the Two Miles Falls Water Power Company, which then operated a plant of 1,250 h.p. The dam was of timber crib construction. At the beginning of 1920 the city passed a by-law providing for the building of a dam, tail-race and electricity-generating station on this site, the cost being estimated as follows: dam, \$147,000; generating-station and tail-race, \$38,000; electrical machinery, \$53,000. This sum was to be obtained from the sale of municipal bonds.

The Dam

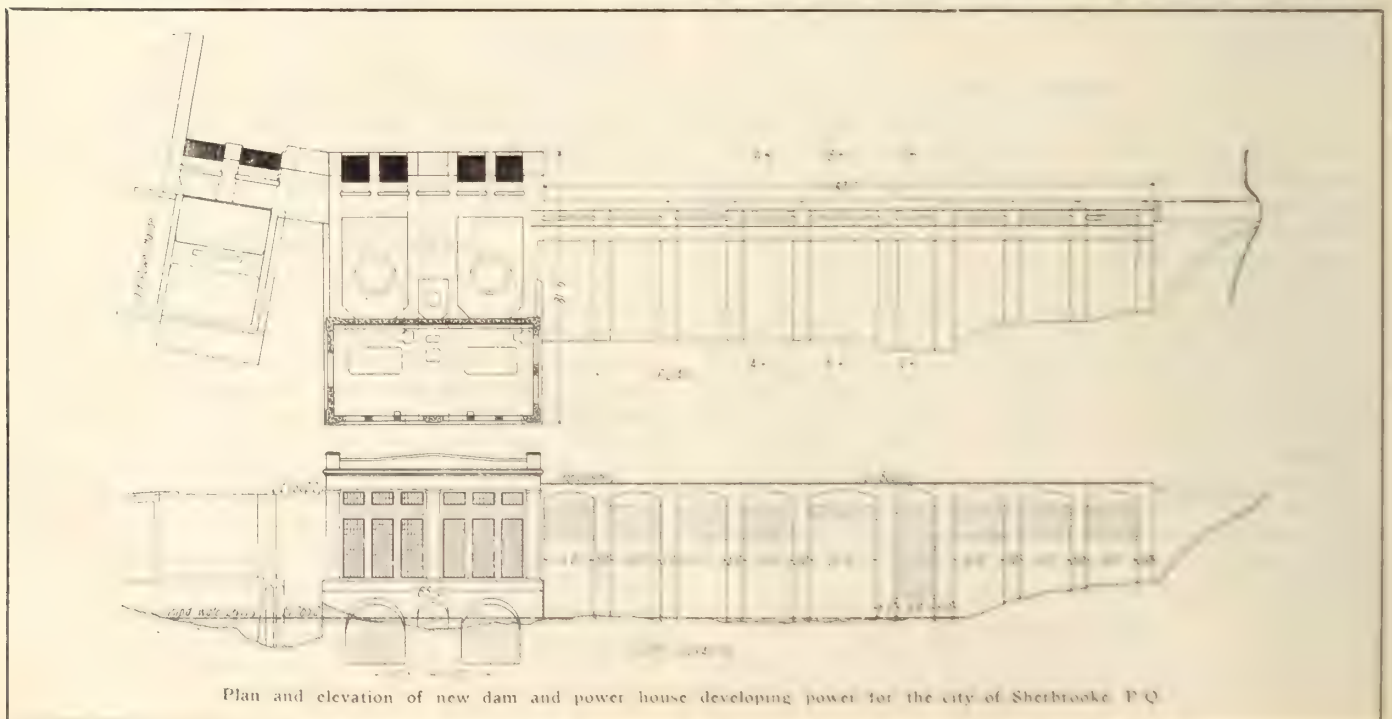
The dam is a monolithic structure, of reinforced concrete, about 375 feet long. The piers are about 40 feet high,

12 feet in length at the top, 42 feet in length at the base, and 5 feet thick, except at the flood gate, where they are six feet thick. The piers are provided with grooves, formed by a steel channel and plate section imbedded in the concrete, to receive the stop-logs of B. C. fir, 12 inches square. The tops of the piers are held together by concrete arches, which support a track on which is carried the lifting mechanism for the gates. There are slots in the arches between the piers to allow of the placing and removal of the stop-logs. The reinforcing steel in the piers and arches is so placed that temperature stresses are also cared for.

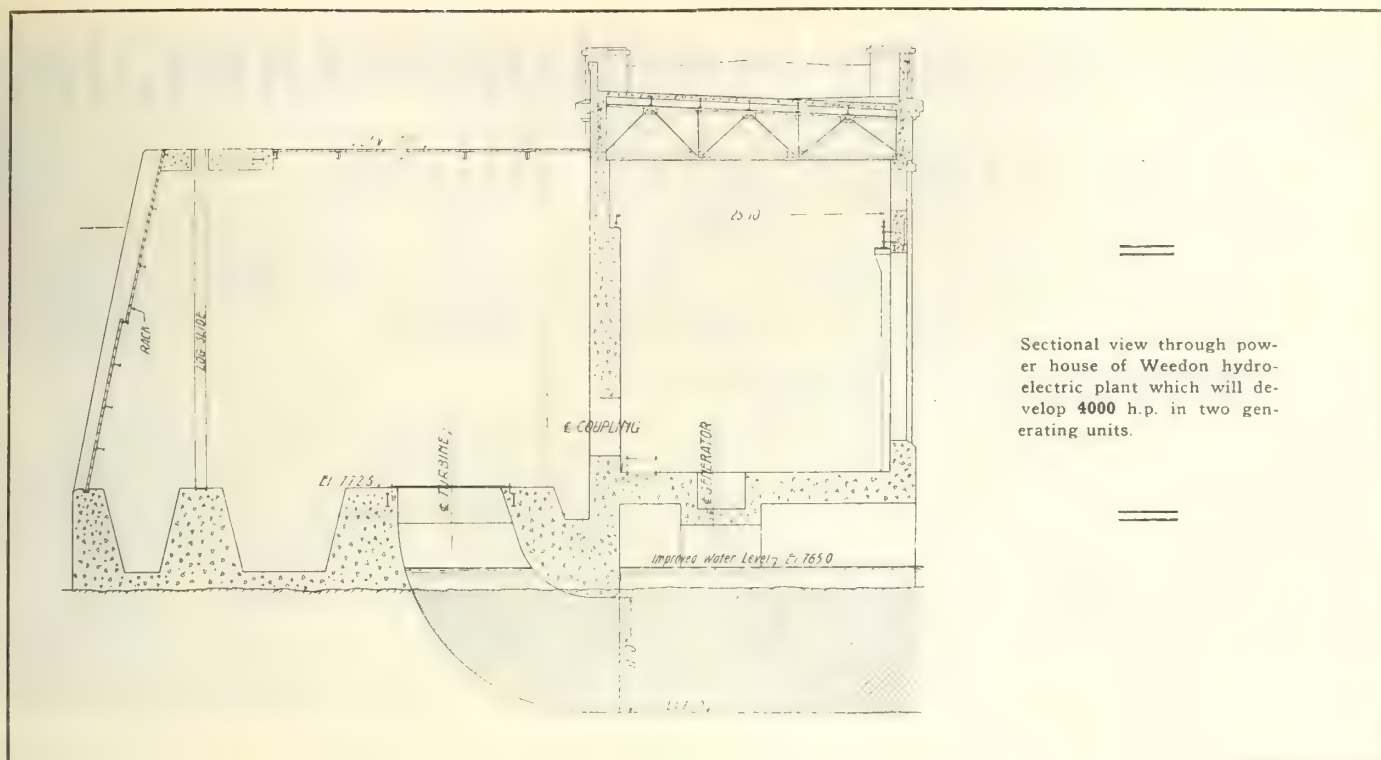
The Power-house

The new power-house is of reinforced concrete and contains two 1,500 kv.a. water-wheel type, Westinghouse generators, three-phase, 60 cycles, 2,300 volts, 225 r.p.m. and directly coupled to two 2,000 h.p. Boving Hydraulic Co. turbines of a guaranteed efficiency of 88.5 per cent.

As the three plants at Rock Forest, Weedon and Sherbrooke, are in parallel, a motor-generator exciter set will be used instead of a small exciter wheel. In this way as much of the river water as it is possible to utilize will be used.



Plan and elevation of new dam and power house developing power for the city of Sherbrooke P.Q.



the a. c. generator wheels, giving an efficiency of 85 to 88.5 per cent., so that no loss of efficiency is incurred, and, moreover, there is a saving in power. However, provision is made for the installation of a water-wheel exciter should this plant be operated separately from the others. The turbines are controlled by two of the latest type Lombard governors.

The 1,000 k.v.a. 2300 volts, three-phase, 60 cycle unit will be left in the old power house, as it can be used during nearly six months of the year. It will also serve as an emergency unit should one of the two units in the new power-house be damaged in any way.

The forebay is protected by racks made in two sections for cleaning purposes. An intake is provided with a view to the future development of the Two Miles Falls plant below the Weedon dam, for should it be decided that to operate this second plant, under a 90-foot head, a flume 6000 feet long, from the Weedon plant to Two Miles Falls, would have to be built.

The tail-race is excavated in rock, and will be 25 feet wide and 500 feet long.

Construction

A camp to accommodate some 120 men was constructed at the site, which is 3 miles from Weedon railway station. Work on the dam was begun on June 7th, 1920, when a concrete wall, extending from the old timber dam to an island about 80 feet below, was built in order to divert the water from the left half of the river, while concrete cofferdams were being constructed and so placed as to be later incorporated in the dam itself. As a result one pump sufficed to take care of the water.

It was found that the rock which forms the bed of the left half of the river consisted of horizontal layers four to five feet thick, and there were voids two or three inches thick between these layers which allowed the passage of water. After boring to a depth of about 12 feet below the surface of the rock, it was decided that excavation would be too costly. The problem was effectively dealt with by drilling a series of holes about 1½ inches in diameter, at intervals of three feet, and by means of compressed air cement grout was forced down into the interstices.

The swelling of the River Salmon, which flows into the

St. Francis just above the Weedon dam, had to be provided for, and no trouble was experienced.

Concrete pouring was carried on night and day, and an occasional temperature of ten degrees below zero has not hindered the progress of the work, the materials being steam-heated and carefully protected after placing.



Cross-sectional views of dam.

The dam and power-station were designed by Mr. C. J. Desbaillets, formerly manager and chief engineer of the Corporation of Sherbrooke, the contractors being the Foundation Company, Limited. The resident engineer for the city of Sherbrooke is Mr. A. Crepeau.

The "Transactions and Year Book of the University of Toronto Engineering Society," published in book form, constitutes a most attractive record of the Society's work for the past year.

This is the first appearance of "Transactions" for fourteen years; from 1907 to 1916 its place was taken by "Applied Science," and from 1916 to the present time "School" has had no official publication.

The volume appears to fulfill its function of bringing the Alumni in closer touch with the undergraduates; besides papers read before the Engineering Society it includes a complete record of all other activities and cannot fail to interest any "School" man.

A delegation of members of the House of Commons recently visited the Welland Canal and the hydro plant at Chippewa.

Large Electric Installation Operates Comax Coal Mines

**Water Conveyed from Diversion Dam Through Rock Canal, Suspended Wooden Flume and Ditch to Wood Stave Pipe Line Leading to Power House—
All Mine Equipment Electrically Operated**

The Comax group of mines on Vancouver Island have an electric installation, by means of which everything about the mines needing power to operate is supplied with electric current. This installation forms one of the largest and most modern of all the plants used in connection with coal mining anywhere on the continent.

A complete description of the electric installation was given recently by Mr. F. Sawford, A.I.E.E., before the Vancouver Electric Club. The plant is situated on the Puntledge river about one mile from Comax Lake, where a diversion dam was built. From this point the water was conveyed about two miles by means of a rock canal, a suspended wooden flume and a ditch. By a reinforced concrete intake, with a capacity of 1200 second feet, the water was brought to a pipe line and penstocks with sand trap, Taintor gate and spillway. The pipe system comprises about one mile of wood stave pipe, 8 feet in diameter, ending in a concrete Y-branch from which provision for two 6-foot wood stave pipes with 6-foot valves has been made. From this point one 6-foot wood stave pipe is installed, Fig. 3, approximately one mile long, ending in a concrete Y branch from which two 4' 6" wood stave pipes, Fig. 4, with valves at Y branch, take it to a straight pipe thence to a lock joint steel pipe. Pitot tubes are installed in the penstocks at the power house to measure the water, which has a static head of 350 feet from the intake to the power house with a working head of 270 feet.

The power house is a reinforced concrete building containing two 6,000 h.p. Escher-Wyss, Francis type, turbines, 500 r.p.m., directly connected to a C.G.E. generator and excitor, 4000 kw. at 13200 volts, 25 cycle, 3 phase. There are no transformers in the station except a 100 kw. stepdown for station use, the power being transmitted at the voltage

as generated. The switchboard is placed in an annex, in a gallery overlooking the generator sets; generators and lines are protected with remote control switches enclosed in concrete cells. The power house is one of the simplest in construction. It is completely fireproof and the use of combustible material of any kind is avoided. The cables are all carried in ducts, which are buried in concrete floors and walls.

Four 3-phase transmission circuits leave the power house, consisting of 2/0 stranded cable; two circuits each on two separate pole lines. The transmission system is connected in a complete ring, connecting each sub-station on the ring, so that any section can be isolated without interrupting the supply, making in all about forty miles of transmission line.

Sub-stations are located at Nos. 4, 5, 7, 8 Mines and at Union Bay. No. 8 sub-station is the largest and contains two 3-phase, 1,000 kw. transformers, 13200 to 2200 volts and one 500 kw., 13,200 to 440 volts; transformers are O.I.W.C.; the whole is mounted on a wheeled base on tracks for quickly pulling out from sub-station in case of emergency. Sub-stations 4 and 7 are next in size containing one 1500 kw. 3-phase transformer, 13200 to 2200 volts, and one 250 kw., 13200 to 440 volts. No. 5 sub-station contains one 1000 kw., 13200 to 2200 volts, and one 250 kw., 13200 to 440 volt transformer; all transforming equipment is duplicated in each sub-station except as to size. Lines are brought into each sub-station by special entrances to oil switches mounted in reinforced concrete cells. All H.T. lines are protected in concrete cubicles. Each sub-station has receiving switchboards for the 2200 volt and the 440 volt services and in every case, where possible, has been designed so as to have in the same building, hoisting and other equipment required by the mine in order to reduce operating costs. All safety

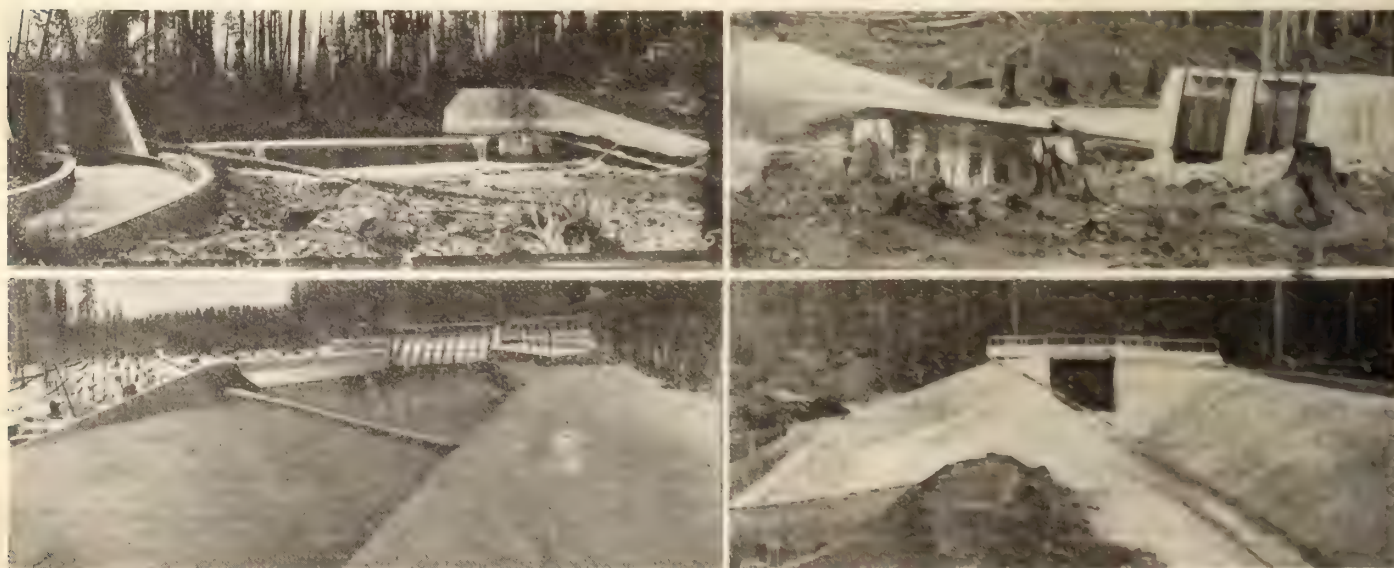


Fig. 1—(upper left) Diversion dam looking upstream. Fig. 2—(upper right) Diversion dam looking downstream. Fig. 3—(lower left) Forebay for 8 ft pipe line, two miles from diversion dam, showing Taintor gate. Fig. 4—(lower right) Forebay before water was turned in.

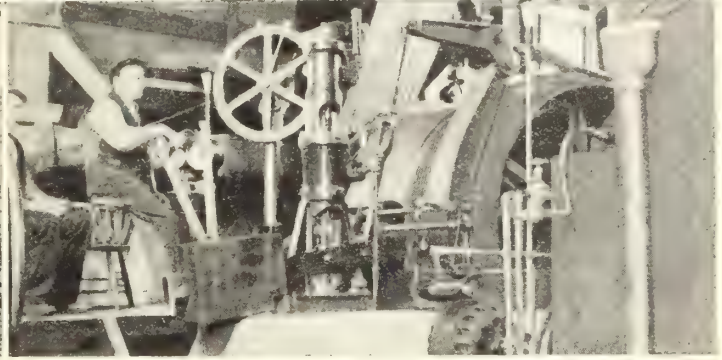
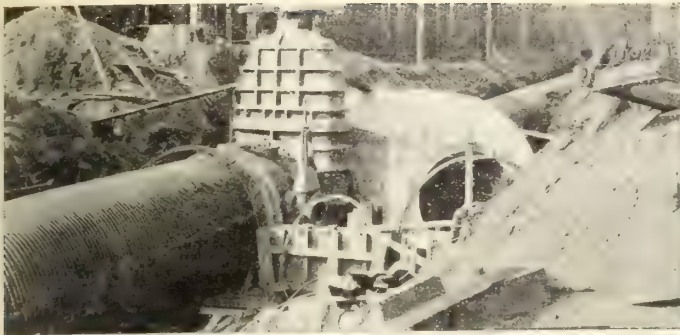


Fig. 5—(upper left) 6 ft. wood stave pipe to concrete Y with gate valve. Fig. 6—(upper right) 6 ft. stave pipe to Y branch; 4 ft. 6 in. wood stave pipe leaving Y. Fig. 7—(lower left) 6 ft. wood stave pipe showing concrete saddles. Fig. 8—(lower right) Shaft hoist motor, 350 horse power, liquid controller.

devices which can make equipment "fool-proof" are utilized.

At No. 8 mine there are two Siemens electric hoists with Robeys mechanical equipment; the larger has a capacity of 1500 h.p. directly connected to double conical drums with clutches operated on the Ward Leonard control system which includes the motor-generator sets; the smaller hoists having a 750 h.p. motor with single drum hoist and clutch.

All screening plants are operated by 440 volt motors up to 50 h.p. which are operated at 2200 volts; all equipment underground is operated by the 2200 or 440 volt services; locomotives are 250 volt d.c. operated by motor-generator sets in sub-station. No. 7 mine has a 750 h.p. motor operated hoist 2200 volt, 3-phase, 25 cycle. This is operated from a platform by means of liquid rheostat developed by the Westinghouse Company. These have proven very successful. In the same building is a 500 h.p. synchronous motor at 500 r.p.m., belt connected to air compressor, which is put in for power-factor correction. The motor has a 50% full load

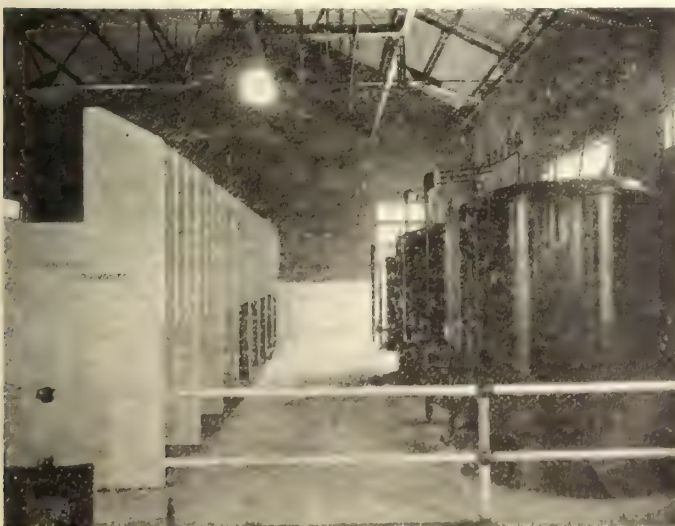
starting torque, started up as an induction motor by transformers and paralleled to line in usual way.

The sub-station at Union Bay is on the end of a 13 mile transmission line and is the only one not connected in the ring. It contains one 500 kw. 13200 volt to 2200 volt, and one 250 kw. 13200 to 440 volt transformer. Lines from this sub-station feed coal washers, coal loading plant at the wharves and provide power and light for the district.

The ventilating systems at the mines are especially worthy of note as the most important thing here is freedom from interruption; therefore these motors are equipped with full automatic liquid rheostats for starting and start themselves when power is on whether the operator is present or not. A great deal of equipment in addition to the foregoing, including coal cutters, pumps, fans, etc., etc., is in use at these mines and all are electrically operated.

Noted Financier Visits British Columbia

A noted visitor to Vancouver, B.C., connected with the electrical industry, is Mr. T. Blundell Brown, of London England. Mr. Brown has been a director of the British Columbia Electric Railway for over twenty years and is also a director of the British Empire Trust Company. Mr. Brown told the members of the Electric Club, at a recent meeting, that he and his principals had every faith in the future of British Columbia, and further stated they were at the present time trying to raise large sums of money for future additions and extensions to their holdings in the Province.



No. 8 Mine, showing sub-station transformers and high-tension switch-gear in concrete cells.

The annual report of the Department of Telephones of Saskatchewan for 1920, gives a full review of the telephone situation in that province. New work listed in the report includes 712.45 miles (pole mileage) of toll lines, the installation and opening of exchanges in 28 towns, and the introduction of an automatic exchange, serving 330 subscribers, in Qu'Appelle. A complete list of all rural companies is included in the report, and an appendix gives information re the organization of rural telephone companies.

Some Special Transformer Connections to Supply Synchronous Converters

R. V. C. R. REID
Shawinigan Water and Power Co.

During the recent war considerable difficulty was experienced in Canada in securing the electrical apparatus urgently needed in munition plants and for the industry in general. This condition of affairs resulted in the pressing into service of anything in the way of equipment that could be made to do the work. Some of these emergency arrangements in connection with synchronous converter installations are described below.

At a chemical plant direct current was required to operate a line of electrolytic cells. The current required was 1,600 amps at approximately 390 volts. There was available a synchronous converter and a bank of 550/220 volt transformers. The converter was rated at 1,000 kw., 600 volts, 6 phase, 60 cycle; it was provided with inter-poles, also with a light squirrel cage winding on the field poles to give the necessary torque for starting inductively. The power supply was at 600 volts, 60 cycle, three phase. The transformer bank consisted of 6-50 kw. and 6-100 kw. oil filled,

the d.c. voltage to give the required current when one or more of the electrolytic cells were cut out, or to compensate for voltage variations on the a.c. supply circuit.

Subsequently a layout was made up for the installation of the same converter and transformer bank to supply 550

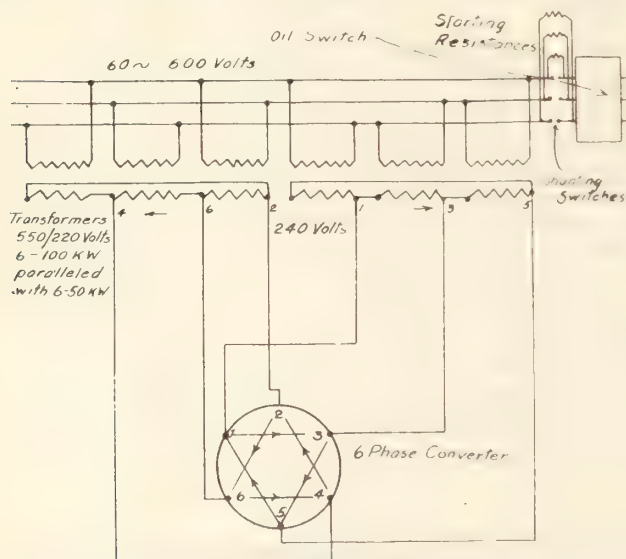


Fig. 1.—Converter connected to give 390 volts d.c.

pole type, service transformers. They were connected in two delta banks to supply the six phase current to the slip rings of the converter, a 50 kw. and a 100 kw. transformer paralleled in each leg. This arrangement gave a d.c. voltage $E_0 = E_s / .61 = 240 / .61 = 392$ volts which was the voltage required.

A diametrical connection would have made it easier to provide reduced voltage taps for starting, but the required d.c. voltage could not be secured in this way. Instead of reduced voltage taps, a starting resistance was built and introduced into the 600 volt leads as shown in Fig. 1. This resistance consisted of three paralleled coils of No. 4 galvanized iron wire per phase. These coils were close wound to a length of four feet on a two inch mandrel and stretched to six feet in mounting on the supporting insulators. The insulators were attached to a steel frame mounted on the substation wall so that the resistance coils hung vertically. This very crude arrangement worked quite satisfactorily, the converter taking about 150 per cent full load current at stand-still and coming up to speed rapidly. By means of a field rheostat it was found possible to vary

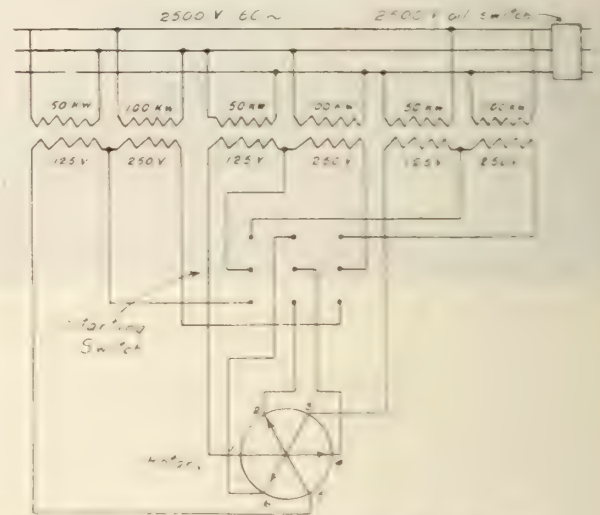


Fig. 2—Transformer connections for 600 volt rotary

volts d.c. to a street railway system, taking power from a 2,500 volt, three phase bus. The transformers were to be connected for 2200 volts on the high tension side and for 110 and 220 volts on the low tension side as shown in Fig. 2. This would provide a 33-1/3 per cent tap for starting. There were five and ten per cent. taps on the 2200 volt winding which made it possible to secure a higher d.c. voltage if required.

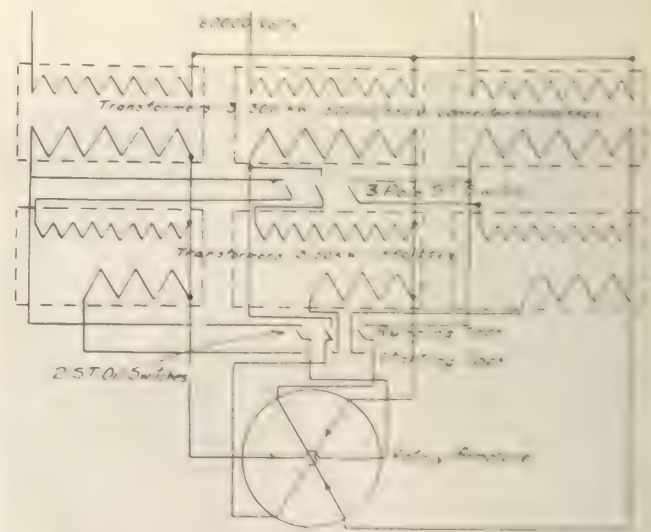


Fig. 3

A converter of the same type as the one described above was installed to supply 600 volts d.c. to an electric terminal railway. The power was taken from a three phase, 60,000 volt line, through a bank of 3-300 kw., outdoor type, self

cooled transformers. These transformers had a ratio of 50,000/550 volts, but there were ten per cent. primary taps available and by using these taps, and Y connecting the primary side, a ratio of $(\sqrt{3} \times 45,000) / 550 = 60,000/424$ was obtained. The secondaries of the three transformers were diametrically connected to the slip rings of the converter thus giving 600 volts d.c. There were no starting taps available on the low tension side of the transformers, so 3-50 kw., 550/220 volt transformers were installed for that purpose. Hand operated oil switches were provided for the starting circuit and the running circuit as shown in Fig. 3.

There was some doubt about the operator being able to close the running switch quickly enough to prevent the converter dropping out of phase with the line, but no trouble was experienced on that score. As a matter of fact the installation gave entire satisfaction and is still in operation, pending its replacement by standard equipment.

An Act to Make More Equal Provision for Cost of Hydro Power

We commented in our issue of April 1, page 31, on a report presented to the Provincial Government on the question of bonusing municipalities as an assistance to the introduction of hydro-electric power where the cost at present is too great to justify its installation. Following this report a bill was prepared and presented to the House by Mr. Carmichael which deviated considerably from the recommendation in the report but, nevertheless, was so framed as to give outlying municipalities a very considerable measure of financial assistance at the expense of other municipalities more favorably situated as regards proximity to the source of power supply. This Bill, with certain amendments, was passed by the House and comes into force on the 1st of June.

The Bill, as presented by Mr. Carmichael, is printed herewith, and the amendments are noted afterwards:

No. 262.

1921.

BILL

An Act to make more Equal Provision for the Cost of Hydro-Electric Power in Ontario

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. This Act may be cited as The Rural Hydro-Electric Distribution Act, 1921.

2. There shall be established a fund to be known as the Hydro-Electric Power Extension Fund, hereinafter called the Fund, and the Treasurer of Ontario shall open in the books of the province an account to be known as the Hydro-Electric Power Extension Fund Account.

3. There shall be placed to the credit of the said fund in such account annually at such time as the Lieutenant-Governor in Council may direct:—

(a) A sum equivalent to the total amount falling due to the province from the rentals of water powers since the 1st day of January, 1918, but not including rentals falling due under agreements entered into by the Commissioners of the Queen Victoria Niagara Falls Park for the development of power within the park;

(b) A sum equivalent to the revenue derived from the rentals payable or collectable under the several agreements between the Commissioners of the Queen Victoria Niagara Falls Park, and certain companies developing power in the Queen Victoria Niagara Falls Park after deducting any sums required to meet the charges and payments referred to in sections 21 and 24 of The Queen Victoria Niagara Falls Park Act;

(c) Such additional sums as may from time to time be declared by the Lieutenant-Governor in Council to be required for the purposes hereinafter mentioned.

4.—(1) Where Hydro-Electric power is distributed in any town having a population of less than 5,000, or in any township, incorporated village, police village, or in a rural power district under the provisions of The Power Commission Act and amendments thereto, and the cost of supplying such power to the town, township, incorporated village, police village, or rural power district exceeds \$40 per horsepower per annum and the works for the distribution of such Hydro-Electric power are owned or operated and controlled by a municipal corporation, or by a commission acting on behalf of the municipal corporation, or by the Hydro-Electric Power Commission of Ontario, there may be paid out of the Consolidated Revenue Fund to such municipality or commission, upon the order of the Lieutenant-Governor in Council, in any year, a sum equal to thirty per cent. of the amount by which the cost of the power exceeds \$40 per horsepower per annum, but the total amount of any grant under this section shall not exceed \$25 per horsepower per annum.

(2) This section shall apply to a municipality or rural power district in which Hydro-Electric power is supplied as set forth in subsection 1 at the time of the passing hereof, and to a municipality or rural power district which may hereafter enter into a contract, agreement or arrangement for the extension of any existing system for the transmission of Hydro-Electric power and its distribution in such municipality or rural power district.

5. Where power is supplied to a rural power district under the provisions of The Power Commission Act and amendments thereto, there may be paid to the municipality or commission distributing the power in such rural power district in any year, upon the order of the Lieutenant-Governor in Council, a sum not exceeding fifty per cent. of the annual charges necessary to provide for the cost of constructing, erecting and maintaining in the rural power zone primary transmission lines and cables required for the delivery of power in such rural power district.

6. The grants made under this Act shall be payable out of the Consolidated Revenue Fund and the sums required to be credited to the fund shall be chargeable to the Consolidated Revenue Fund, and every grant of money made under this Act shall be debited to the fund in the said account and the said account shall be so kept that at all times it shall show the amounts properly credited to the fund as provided by section 3 and all amounts chargeable thereto.

7. The Lieutenant-Governor in Council may make regulations for the better carrying out of the provisions of this Act.

8. This Act shall come into force on the 1st day of June, 1921.

Amendments

Paragraph 3, section 3, was amended to read "Such additional sums as may from time to time be voted by the Legislature of the Province of Ontario for the purposes herein-after mentioned."

Section 4 was struck out.

In Section 5 the words "Upon the recommendation of the Hydro-electric Power Commission of Ontario and" were added before the words "upon the authority of the Lieutenant-Governor in Council," etc.

Quick disposal was made of the issue of \$1,340,000 Ontario Hydro-electric Power bonds, guaranteed by the Province, and which were placed on the market recently by a syndicate headed by Wood, Gundy & Co. The entire issue was over-subscribed in a few hours. The price to the public was 76.89, to yield 6.05. The bonds bear $4\frac{1}{2}$ per cent. and their chief appeal apparently lay in the fact that they do not mature until 1960.

The Economic Design of High Tension Transmission Lines

By W. P. DOBSON

Director Strachan Ave. Laboratories, Toronto*

The design of a high tension transmission line is an economic problem into which many variables enter. Owing to the large number of these variables and to the complex interrelations among them, the solution of the problem must be a compromise based ultimately upon judgment and experience. Mathematical analysis may, however, form the starting point of the study of the problem, and its results, if properly interpreted and applied, may be of value in leading to an economic design.

Since the most economical design requires that the cost of the completed structure, or the annual carrying charges thereon, be the minimum, a simple mathematical solution of the problem is possible, provided the cost can be expressed in terms of a single variable. This is obviously impossible.

The factors entering into the cost of a line are:—

1. The cost of right of way, including surveys.
2. Cost of towers.
3. Cost of foundations.
4. Cost of erection of towers.
5. Cost of insulators and line supports.
6. Cost of stringing wire.
7. Cost of wire at place of erection.

Items 1 to 6 may form the basis of a study of the most economical span length or tower spacing. For minimum cost the product of the number of line supports and the cost of each support must be the minimum. An analysis¹ of these conditions yields an expression for the most economical spacing which is practically independent of the size of wire or location of the line, and depends upon the conductor material. For copper the most economical span as determined by this analysis is about 600 feet.

The most economical voltage is usually determined from consideration of regulation. The distance of transmission and the load will therefore appear in any expression for this quantity. Such an expression has been given by Still in the following form:

$$\text{Kilovolts} = 5.5 \sqrt{L + \frac{KW}{100}} \quad (1)$$

where L is the distance in miles and KW is the estimated maximum load in kilowatts.

This is an empirical formula which has been found to agree fairly well with practice. An attempt² has been made to derive an analytical expression for the most economical voltage, taking Kelvin's Law as the starting point and assuming that the most economical voltage is the highest possible without excessive corona loss upon a conductor of Kelvin's economic section. This analysis applies only to lines of sufficient length that the terminal apparatus is not the determining factor in the cost.

The third factor and that to which greatest importance has heretofore been attached, is the conductor size. To the determination of the most economical size of conductor, mathematical analysis was first applied by Lord Kelvin, who in 1881 proposed the following law:

"The most economical section of conductor is that for which the annual cost of energy loss in the line is equal to the charge for interest on the capital cost of the conductor plus annual charges for depreciation and sinking fund."

The law is usually expressed by the formula:

$$S = K \sqrt{\frac{N}{AP}} \quad (2)$$

where S is the economic size of conductor in circular mils per ampere.

N is the cost of the power wasted in the line wires in dollars per horse power year.

P is the cost of the conductor material in cents per lb.

A is the % interest, depreciation and sinking fund.

K is a constant depending on the conductor material.

(K = 6750 for copper, 15800 for aluminum.)

The size of conductor is immediately obtainable when the



Fig. 1. Chart for determining economic section according to Kelvin's Law. Join value of P and A by a straight line. Join point of intersection of this line and unscaled line with value of N. Read economic section on copper or S.R. aluminum scale.

current is known. Fig. 1 shows a chart from which the economic section according to Kelvin's law may be readily calculated.

The above formula is simple in form but its application requires considerable judgment on account of the difficulty of determining the most suitable values of the variables A, P, and N to use in any special case. The cost of conductor material P is definitely known in any case, but its value may change during the life of the line. In the absence of extraordinary conditions such as existed during the war, the normal trend of variation in cost of material is a gradual increase. If this is accompanied by a decrease in the cost of power, the economic section will be decreased. It will be shown below, however, that the great increase in costs during recent years makes necessary considerable modifications in economic section. The value selected for depreciation, interest and sinking fund (A) is also a matter of judgment. The most difficult factor to determine, however, is the cost of the energy wasted in the line conductor N.

If the demand for power is unlimited and in excess of the supply, then N may be taken as the market value of the power so wasted. On the other hand, if the supply of power is greater than the demand, N should be taken as the cost of producing power at the generating end of the line (high

*Hydro-electric Power Commission of Ontario.

tension bus). The latter assumption will result in a smaller conductor than the former.

The effect of an increase in cost of conductor material and a decrease in the cost of wasted energy is to decrease the circular mils per ampere (s), that is, to increase the current density. It is to be expected, therefore, that economic conditions will in the future dictate higher current densities than have been obtained in the past.

Having determined the circular mils per ampere, the size of the line conductor is known when the current has been determined. The value of the current will depend upon the load factor. It is, therefore, necessary to assume or estimate the load curve for the period to be considered. The assumed current must produce the same I^2R losses for the period, as the actual load current. Its value must thus be the r.m.s. value of the current load curve for the period considered. A further consideration enters here, viz., the variation in conductor resistance with variation in temperature. Assuming a total annual variation of 150°F , the variation in resistance of copper or aluminum would be about 35%. This will render necessary a reduction in the value of the current calculated from the load curve.

The statement of Kelvin's Law given above assumes that the cost of towers and the cost of stringing the line con-

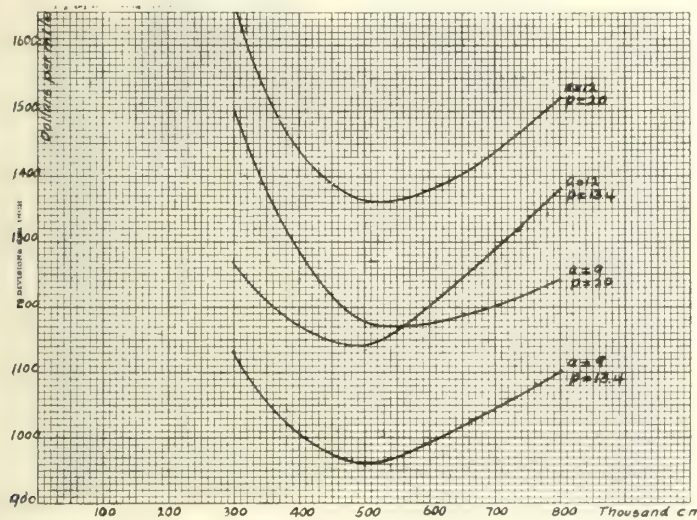


Fig. 2. Costs of S.R. aluminum line for varying conductor size and fixed charges.

ductor is independent of the conductor size. This is only true for the smaller sizes of conductor.

From the analysis given above, it may be expected that any application of Kelvin's Law must be supplemented by a cost estimate of the line, including supporting structures and erection. Such a comparison will show that the application of Kelvin's Law in its original form yields an economic section higher than that obtained by considering the effect of change in conductor section upon the supporting structures.

The following analysis proceeds from the assumption that the cost of the line towers and conductors can be divided into two parts, one independent of the size of conductor and the other proportional thereto. The cost of the generating station is also included.

The total costs are composed of:

- (1) Cost of corona and leakage loss.
- (2) Carrying charges independent of conductor cross section and those proportional thereto.
- (3) Cost of energy loss in line resistance.

Let K = total annual carrying charges in dollars per mile of line.

I = current (r.m.s. value of ampere load curve).

u = resistivity of conductor material in ohms per cir. mil-mile.

w = corona and leakage loss in kw. per mile.

c = line cost independent of conductor section (dollars per mile).

p = line cost proportional to conductor section (dollars per mile per cir. mil).

q = cross section of conductor in cir. mils.

y = interest, depreciation, etc., on generating station.

a = interest, depreciation, etc., on line.

m = capital cost of generating station (dollars per kw.).

n = cost of energy loss in line wires (dollars per kw. year).

$$\text{Then } K = w(my+n) + a(c+pq) + \frac{3I^2u}{q}(my+n) \dots\dots(3)$$

$$\text{for minimum cost } \frac{dK}{dq} = 0$$

$$\therefore \frac{q}{I} = \sqrt{\frac{3u(my+n)}{ap}} \text{ circular mils per ampere} \dots\dots(4)$$

If the station costs and effect of conductor size on line cost be neglected, this will reduce to equation (1). Equation (4) is thus a representation of Kelvin's Law modified as follows:

"The most suitable conductor section is that for which the annual cost of the energy loss is equal to the charge for interest, depreciation, etc., on that part of the capital expenditure which is proportional to the conductor cross section."

The problem of transmission economics may also be resolved into the determination of the most economical load corresponding to a given line. Referring to equation (3) and assuming that the load is proportional to the current,

the most economical load will be found by differentiating $\frac{K}{I}$ with respect to I .

$$\text{Thus } \frac{I}{q} = \sqrt{\frac{w(my+n) + a(c+pq)}{3uq(my+n)}} \dots\dots(5)$$

amperes per cir. mil.

The equations derived above will be applied to the following example:

It is required to transmit a load of 50,000 h.p. a distance of 100 miles. The load factor is assumed to be unity and the power factor of the load 80%. It is desired to make a comparison between copper and steel-reinforced aluminum on the assumption that the load is to be carried by one single circuit line.

Let interest, depreciation, etc., be 9%.

" cost of power be \$10.00 per h.p. year.

" cost of copper = .31 per lb.

" cost of S.R. Al = .29 per lb.

Applying formula (1) or Fig. 1.

$A = 9$.

$P = 31$ and 29 .

$N = 10$.

S for copper = 1270 cir. mils per ampere.

For S.R. Al = 3100 cir. mils per ampere.

Applying formula (2) the economic voltage is found to be 120,000.

Assuming 110,000 as the receiver voltage the current will be 245 amperes.

The corresponding conductor sizes are 310,000 C.M. for copper and 760,000 C.M. for S.R. Al.

In applying the analysis of equation (4) it is necessary to determine the cost of line towers plus conductors in terms of conductor section, i.e. to determine "c" and "p." These may be calculated from cost data of various types of tower construction. For the given case of single circuit construction

these factors were found to be approximately as follows:—

For copper $c=230$ $p=0.025$.

For S.R.Al. $c=230$ $p=0.012$.

Equation (4) becomes, after substitution of the values for resistivity of copper and aluminum, and neglecting the generating station costs:—

$$\frac{q}{I} = 128 \sqrt{\frac{n}{ap}} \quad \text{for Copper} \dots\dots\dots (4a)$$

$$= 164 \sqrt{\frac{n}{ap}} \quad \text{for S. R. Aluminum} \dots\dots\dots (4b)$$

Substituting the values found above:

$n=13.4$; $a=9$; $p=0.025$ for copper $=0.012$ for S.R. Aluminum.

We obtain

$$\frac{q}{I} = 990 \quad \text{for Copper}$$

$$= 1830 \quad \text{for S. R. Al.}$$

The corresponding conductor sizes are 243,000 cir. mils for copper and 450,000 cir. mils for steel-reinforced aluminum. Substitution in equation (3) we obtain the minimum annual charges for both copper and s.r. aluminum. In this case the s.r. aluminum is about 11% more economical than the copper.

The accuracy of the results yielded by the above analysis depends on the determination of the value of "p," or that portion of the line cost proportional to the conductor cross section. This is determined by the price of conductor material and by the relation between tower weight and conductor weight. The other items listed early in the paper have a negligible effect upon "p."

If the values of power cost and interest, depreciation, etc., can not be definitely fixed, the determination of the most economical section by the formulae given should be supplemented by a calculation of carrying charges for several values of these factors. Fig. 2 shows the results of such a calculation. It may be concluded from this figure that for the case under consideration a section of 500,000 c.m. s.r. aluminum would be most economical.

The inclusion of the cost of the generating station will result in an economic section considerably higher than that indicated by formula (3b).

Assuming $m=100$ and $y=14$ for the capital cost per kw.

of installed capacity and the fixed charges on the generating station respectively, we obtain:

$$\frac{q}{I} = 164 \sqrt{\frac{14 + 13.4}{9 \times .012}} = 2620$$

$$q = 640,000 \text{ cir. mils for S. R. Al.}$$

as compared with 450,000 by formula (4b).

Recent figures⁴ for the cost of hydro-electric plants are much higher than that used above and the application



J. B. Woodyatt, General Manager, Southern Canada Power Co. and a Vice-president of the Electrical Co-operative Association of the Province of Quebec.

of these higher figures would considerably increase the economic section.

The fixed charges form the largest portion of costs on a hydro-electric plant, the operation, maintenance, etc., being small, so that we must conclude that under present conditions of high cost, the economic section of conductor for a transmission line connected to a hydro-electric generating station must be much larger than those obtaining on existing lines.

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4. P. M. Lamond, *Electrical News*, May 1st 1921.



De Gaspé Beaubien, Consulting Engineer, Member Advisory Council, Quebec Electrical Co-operative Association.



J. W. Pilcher, Manager, Can. Gen. Elec. Co., Montreal, a Vice-president of the Electrical Co-operative Association of the Province of Quebec.



L. C. Haskell, Southern Canada Power Co. Secy.-treas. of the Electrical Co-operative Association of the Province of Quebec.

The Electrical Contractor

An Act Respecting the Examining and Licensing of Electrical Contractors and Journeymen

A forward step has been taken toward the elimination of one of the worst factors in the electrical contracting industry, namely, irresponsible and incompetent contractors, by the introduction of a Bill in the Legislative Assembly of the Province of Ontario, by Mr. Swayze, named "An Act Respecting the Examining and Licensing of Electrical Contractors and Journeymen Electricians." The Bill was given its first reading and then, by arrangement, laid over until next session when it is hoped, with some minor amendments, it will be made law.

A cursory reading of the Bill gives one the impression that it has been fairly carefully prepared, and covers the situation moderately well. There are certain suggestions we should like to offer, but probably this is not the proper time, and we content ourselves with printing the Bill as submitted by Mr. Swayze:

BILL

An Act Respecting the Examining and Licensing of Electrical Contractors and Journeymen Electricians

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. This Act may be cited as The Electricians' Licensing Act, 1921.
2. In this Act, unless the context otherwise requires—
 - (a) "Minister" shall mean the Minister of Public Works;
 - (b) "Board" shall mean the board of examiners appointed as hereinafter provided;
 - (c) "Department" shall mean the Department of Public Works;
 - (d) "Contractor" shall mean and include any person, firm or corporation having a regular place of business, who or which, by the employment of journeymen, performs the work of installing wires, conduits, apparatus, fixtures, and other appliances for the carrying or using of electricity for light, heat or power purposes, within the meaning of this Act;
 - (e) "Journeymen" shall mean a person who does any work in installing, repairing, or making alterations to wires, conduits, apparatus, fixtures or other appliances for the carrying or using of electricity for light, heat, or power purposes within the meaning of this Act, for hire;
 - (f) "License" shall mean the certificate of qualification issued to a contractor or journeyman under the provisions of this Act;

- (g) "Inspector" shall mean a person appointed under the provisions of this Act, as hereinafter provided.

3.—(1) The provisions of this Act shall apply to all contractors, journeymen and inspectors engaged within the province in the business of placing, installing, maintaining, repairing, replacing, or inspecting in or on any class of structure, any conduits of any description, designed for the purpose of enclosing or carrying any electrical conductor, upon which is impressed an E.M.F. equal to or higher than the voltage prescribed in the wiring regulations issued by the Ontario Hydro-Electric Power Commission, between any two conductors and ground independent of the characteristics of the current; of placing, installing, maintaining, repairing, replacing or inspecting in or on such structures, of any conductor switch, attachment, fitting, or any element whatsoever of an equipment designed for the purpose of supplying such electrical service, or for any purpose in connection with such an electrical service.

(2) The provisions of this Act shall not apply to such work within power houses, sub-stations or other places wherein the business of generating or distributing electrical power is carried on by public service corporations or by municipal departments, and where such work is installed by employees under the direction of officers of such public corporations or municipal departments, except in structures wherein the public, other than employees of such public service corporation or municipal department have free access on business.

(3) No apprentice or helper or other person shall perform any electrical work or install any electrical material or appliances within the meaning of this Act, except as an assistant to, in the presence of, and under the direct personal supervision of a journeyman continuously employed on the same contract or job and licensed under this Act, and only one apprentice or helper shall be allowed to each journeyman as assistant on any job.

(4) The provisions of this Act shall not apply to such work on street railway cars or locomotives, or on railway cars or locomotives which are the property of municipal departments or of public service corporations, and where such work is installed by employees under the direction of officers of such municipal departments or public service corporations.

(5) Nothing in this section shall be taken to apply to the insertion of incandescent lamps in sockets or receptacles, or the replacement of such lamps, the carboning, trimming, or operation of arc lamps, the lawful connection of utilization equipment to supply by means of attachment plugs or the use or operation of the same, or the lawful replacement of fuses controlling circuits or equipment.

4. All electrical contractors and journeymen carrying on their work in the Province of Ontario shall be subject to examination before the board of examiners, appointed under the provisions of this Act, and upon the fitness of such contractors and journeymen being established before such board of examiners, licenses, as provided for under this Act shall be issued to such contractors and journeymen.

5. The Lieutenant Governor in Council, upon the recommendation of the Minister, may appoint a board of examiners, consisting of three members, who shall be qualified

in practical clerical work, one of whom shall be an electrical contractor, and one who shall be a practical journeyman electrician, and who are conversant in a practical degree with the qualifications necessary to be held by a person described as an electrical contractor or an electrical journeyman, who shall hold office during pleasure and who, subject to the regulations mentioned in the next following section, and to the approval of the Lieutenant Governor in Council, shall prescribe the subjects in which candidates for a contractor's or journeyman's license shall be examined, and conduct and provide for and supervise the examinations of candidates and report thereon to the department.

6. The board of examiners shall make regulations for—

- (a) The examination of candidates for contractor's and journeyman's licenses, the granting of licenses, and the evidence to be furnished by candidates for contractor's or journeyman's licenses as to previous experience;
- (b) Determining time and duration of licenses, and their renewals;
- (c) Prescribing causes for which a license may be revoked, cancelled or suspended;
- (d) Defining the duties of inspectors and making rules governing their operations.

7. Four license forms shall be issued, designated as follows:—

License A, which may be issued to any person who has satisfactorily passed the examination prescribed for journeymen electricians, and has filed an application to be registered as a contractor in the examiners' office and paid the fee prescribed by this section;

License B, which may be granted to any company, association, corporation, or firm doing or wishing to do business as contractor for electrical installation, provided one of the members of the said association, company, corporation, or firm, or at least one person in its employ, holds a certificate of journeyman electrician given by the examiners, and that the fee for the license has been paid;

License C, which may be given to a journeyman electrician having at least four years' experience, and who, after passing his examination successfully and complying in every respect with the prescription contained in the forms prepared by the examiners, has paid the fee prescribed by this section;

Section D, which is the special license authorizing a person with a knowledge of electricity and employed in a factory, warehouse, or public building, subject to exceptions specified in subsections 2 and 4 of section 3 of this Act, to do work in connection with the repair and maintenance of electrical installations in the said public buildings, and the person applying for such license must pass an examination before the board of examiners.

8.—(1) The board of examiners shall within thirty days after its appointment meet and organize, by the selection of a chairman and secretary, and they shall designate the time and place for the examination of all applicants for license, and the board shall examine the applicants as to their practical and theoretical knowledge of electric wiring and also as to their knowledge of the regulations of the Ontario Hydro-Electric Power Commission, governing such work and such examination shall be made in whole or in part in writing.

(2) If satisfied as to the competency of the applicant, the board shall thereupon issue to such applicant a license

in accordance with section 7 of this Act, authorizing him to follow, engage in or work at the trade or occupation of electric wiring in the Province of Ontario as specified under that section, and the examination fee shall be \$5 for contractors and journeymen electricians and shall be applied in reimbursing the examining board for its services, and the license fee, which shall be \$25 for contractors and \$2 for journeymen electricians, shall be renewed annually upon payment of \$5 by a contractor and \$2 by a journeyman electrician.

9. It shall be the duty of the secretary of the board to preserve and keep all records, papers and books which are required by this Act or by the board, and to do or perform such other work as may be required by the board.

10. Any electrician failing in the examination before the examining board shall have the right to appear before such board thereafter to take the additional examination at the next regular sitting of the board, or any succeeding sitting.

11. Every contractor before obtaining a license shall file a bond with the board of examiners in the penal sum of two hundred dollars, conditional for the faithful performance of his duty as licensed contractor, and for his not permitting any wiring work that he is called upon to do, to be performed by any person in his employ, except by such persons as are authorized to do wiring work under this Act, and for his not violating any of the terms and conditions thereof, or any amendment from time to time made thereto.

12. The license herein provided for of any contractor or journeyman electrician may at any time be revoked for incompetency, dereliction of duty or fraudulent use thereof, after a full and fair hearing by a majority of the examining board.

13. Any person or corporation, who or which, after the first day of July, 1921, carries on such business of electrical contracting without authority of a valid and subsisting license therefor issued under this Act, shall be guilty of an offence punishable, on summary conviction before a justice of the peace, by a fine of not less than fifty dollars nor more than two hundred dollars, and, in default of immediate payment, by not more than three months' imprisonment.

14. Any person who, after the first day of July, 1921, engages in the work of an electrical journeyman in the Province of Ontario without authority of a valid and subsisting license therefor, shall be guilty of an offence punishable, on summary conviction before a justice of the peace, by a fine of not less than \$5 nor more than \$50, and in default of immediate payment, by not more than two months' imprisonment.

15. In the case of industries where workmen are engaged in repair or maintenance of electrical equipment, solely in or upon the premises upon which such industries are carried on, any such workman shall be granted a special license according to License D, as provided by section 7 of this Act, to do such work in or upon such premises upon demonstrating to the satisfaction of the board of examiners that he possesses the sufficient qualification for the work intended to be performed in such premises, and no such special license shall entitle the holder to perform any electrical work outside the premises described in the license, nor shall license be transferable.

16. Each member of any firm and the managing director or other responsible officer of any corporation carrying on the business of an electrical contractor in the Province of Ontario, who or which, after the first day of July, 1921, has not, as a member of the firm or officer of the corporation or in its employ at least one person in possession of a valid and subsisting journeyman's license, shall be guilty of an offence punishable, on summary conviction before a justice of the peace, by a fine of not less than \$50, nor more than

\$200, and in default of immediate payment, by not more than three months' imprisonment.

17. The Ontario Hydro-Electric Power Commission may appoint inspectors, one of whom may be chief inspector, and such other officer or officers as may be deemed advisable for inspection of electrical wiring in the Province of Ontario, and such inspectors shall be persons who hold a license under this Act and who, in the opinion of the commission, have had the necessary practical experience to qualify them for the positions.

18. If, on demand from any duly appointed inspector of the department, any person performing the work of an electrical contractor, or an electrical journeyman, does not produce satisfactory evidence of his being in possession of a valid and satisfactory license therefor, he shall be guilty of an offence punishable, on summary conviction before a justice of the peace, by a fine of not less than \$50 and not more than \$200, and in default of immediate payment, by not more than three months' imprisonment.

19. This Act shall come into force on the day upon which it receives the Royal Assent.

Fuse Failure Due to Heat Generated Within the Enclosing Cabinet

The Underwriters' Laboratories publish an interesting bit of information offered by the chief engineer of a manufacturer of standard enclosed cartridge fuses regarding fuse failure from a cause which has generally been overlooked. It is quite probable, he then states, that in other cases the apparently incorrect performance of fuses has been wrongly attributed to some defect in the fuses themselves rather than to the real cause as illustrated in the case described below.

It is obviously necessary for a fuse to become heated when carrying current, and when the current is the maximum for which the particular fuse is rated, the temperature of the fusible element itself attained in continuous operation must be somewhere near that required to blow the fuse. Under these conditions, the heat generated is dissipated through the filler of the fuse and the tubing and caps to the outer air.

Underwriters' Laboratories' Standard for Cartridge Enclosed Fuses requires a fuse at a room temperature of 24° C. (75° F.) to carry 110 per cent of its rated current continuously without blowing and without a rise of the exterior of the fuse enclosure of more than 70° C. (126° F.) above the room temperature. In other words a fuse in continuous operation may attain an exterior temperature of 94° C. (201° F.). The amount of heat actually produced and radiated from such a fuse is, of course, dependent upon the size of the fuse itself as well as upon its actual temperature, but it is evident that a number of fairly large fuses enclosed in a tight cabinet without ventilation are able to raise the temperature within such a cabinet very materially.

If the form and material of the cabinet are such as to prevent this heat being dissipated, this elevation of temperature may produce premature blowing of the fuses which would not occur if they were operated in the open air or in a well-ventilated enclosure. It is probable that a wooden, asbestos-lined cabinet or one constructed of asbestos board, transite, or similar, poor heat-conducting materials would permit a greater rise of temperature than a steel cabinet similarly located.

In order to check the facts as reported from an actual installation, the manufacturer referred to above conducted a test in which six 150-ampere, 600-volt, cartridge fuses in standard bases were placed in a closed, wooden box about the size of a cabinet such as would ordinarily be used for six fuses like this and were supplied with a 165-ampere current for a period of 2 hr. 9 min., at the end of which time

one of the fuses blew and test was discontinued. At the same time a similar fuse was operated in series with the others, but outside of the cabinet. The temperatures noted were as follows:

Room temperature, 27° C.—80.6° F.

Final temperature of fuse outside of cabinet, 67° C.—152.6° F.

Average temperature of 6 fuses in cabinet, 94° C.—201° F.

Final temperature of air within cabinet, 74.5° C.—160° F.

It appears from this data that under these conditions, the heat generated by the six fuses was sufficient to raise the temperature of the interior enclosure more than 85° F. in a little over two hours, and to cause the fuses in the cabinet to become nearly 50° F. hotter than a fuse outside of the cabinet.

It is suggested that inspection departments and users of fuses who find cases where fuses blow apparently prematurely with currents which they should be able to carry continuously, would do well to investigate the conditions of the installation to determine whether the temperatures of the enclosures in which the fuses are mounted become such as to explain the performances noted.

It should also be noted that in the case above, the temperature finally attained by the fuses in the box is one which, if long continued, will result in a gradual deterioration of the fuses themselves due to the fibre becoming brittle, thus possibly introducing another element of unreliability and danger into an installation where such conditions exist. It may be noted in conclusion that phenomena like those described above are more likely to occur with large fuses than with small ones, in cabinets where a large number of fuses are grouped together, and in cabinets of poor heat-conducting materials.

Attention may also be called to the fact that fuses should preferably not be located where they are for any reason whatever exposed to abnormally high temperatures, since in such place the performance of the fuses which is provided by the careful rating of them by their manufacturers cannot be expected.

Michigan Stamping Co.

The Michigan Stamping Company announce that they have absorbed the Toledo Metal Products Company and have moved from Toledo to Detroit, Mack Avenue and Terminal Railroad, where they will have greatly increased manufacturing space for their line of stamped steel outlet boxes. The company states that numerous detail improvements have been embodied in their latest design so that these can be installed with much greater convenience and satisfaction than could their original designs.

National Convention in Buffalo

The National Association of Electrical Contractors and Dealers will hold their 21st annual convention in Buffalo, N.Y., July 18 to 23. The headquarters of the convention will be at the Lafayette Hotel. Mr. Kenneth A. McIntyre, president of the Ontario Association of Electrical Contractors and Dealers, will read a paper on "Cost Data on Installation Work."

A \$50,000 fire loss was suffered by the Hydro-electric Power Commission of Ontario on May 7th, when fire got a start in the power house near Queenston. Chief Engineer Gaby states, however, that this will not retard the Chippewa power development. The loss is fully covered by insurance.

Schumacher Gray Co., Ltd., Winnipeg, has been awarded the contract for the electrical work on six additional storeys to the Olympia Hotel, Winnipeg.

Electricity Plays Important Part in Lining Connaught Tunnel

By W. C. MAINWARING

District Sales Manager Northern Electric Company, Limited,
Vancouver, B. C.

An engineering feat of great interest and importance has been under progress in British Columbia for some time and we hear very little about it. I refer to the lining with reinforced concrete of the Connaught Tunnel on the Canadian Pacific Railway at Glacier, B.C.

For those not familiar with details, the tunnel was started early in 1914 and opened for traffic during December, 1916. It runs through Mount McDonald in the Selkirk Range and by its construction several miles of snowsheds were eliminated. The line elevation was reduced several hundred feet and many loops comprising seven complete circles of rail were cut out, thereby shortening the rail line over four miles. The tunnel is five miles in length and is double-tracked.

The well-known engineering firm, the Sydney E. Jenkins Co., Ltd., are now carrying on the lining work. Anyone not familiar with this class of work would very likely think it a simple task, but when we stop to consider that many trains pass through the tunnel each day, each one pouring forth volumes of smoke, and that their operation must not be interrupted, we realize that it would be far more simple to build the tunnel than to line it.

Electricity plays a very important part in the project and some of its applications are very interesting. The power plant, situated at the west portal, consists of two 150 kw. generators, each direct connected to 250 h.p. engines. Current is distributed at 2,200 volts and steps down to 550 for power purposes and 110 for lighting. Several thousand feet



Fig. 1.—Lining Connaught Tunnel electrically—Powerful flood lights save twenty minutes every time train passes.

of armored underground cable were required to carry current to where concreting work is now progressing. So far as possible the wires are carried in the pioneer tunnel, which parallels the main tunnel and was used during construction. They are then fed through to the main tunnel at several different points.

Undoubtedly the smoke nuisance presents one of the hardest obstacles to the lining work. In spite of good venti-

lating apparatus it takes a long time to clear the tunnel after a train has passed through and this interrupts the workmen. In the earlier days of the lining acetylene lights were used, but when the present engineering constructors took up the work they installed electric flood lights. These are placed at various points in the tunnel and the light penetrates the smoke to such an extent that work can be recommenced from 15 to 20 minutes earlier each time a train passes than by previous methods of illumination.

The engineers, eager to secure any apparatus that would save time and labor on this work, have made good use of the electric hammer drill. Where there are large holes in



Fig. 2.—Lining Connaught Tunnel in Selkirks—An electric driven cement mixer and air compressor does the work

the roof and walls it is necessary to place expansion bolts with shields to which lagging is fastened. In the early stages of work, holes for these bolts were drilled by hand, but the electric hammer drill now does this work and one drill can do the work of 12 men. Twelve of these drills are used constantly. They are also used to good advantage in drilling holes for blasting.

All branches of this work are interesting but none more so than the blowing of cement. A wooden form is built against the walls and roof of the tunnel and then what is known as the "Blaw Knox" Patent Steel Form is placed 12 inches away. The space between the two forms is closed except for three openings, one in the centre at top and the other about five feet distant on each side. An electric driven cement mixer and air compressor, occupying two flat railroad cars is moved up and the cement is forced into the openings mentioned above by air pressure at 80 pounds. The steel forms which are on rails and collapsible are removed after four days and replaced on the next section ready for cementing. This work is carried on at six different points simultaneously and the average day's work is about 20 feet of finished concrete.

Several motors ranging from three to fifteen horse power are used on the job and lighting receptacles for flood lights, portable electric tools, etc., are placed every five feet.

At the present time only one shift is operated from 6.30 a.m. until 3.30 p.m. About 200 men are employed and being located so far away from any settlement it has been necessary to construct a camp of sufficient size to properly house and feed employees.

This work is being done under the direction of the Canadian Pacific Railway, Engineering Department, Western Lines—Mr. W. A. James, assistant chief engineer; Mr. Frank Lee, engineer of maintenance of way, and Mr. H. Rindal, district engineer.

The Jobber's Salesman's View of His Job—How to Sell the Contractor

By THOMAS F. CANTLER
in The Jobber's Salesman

How to sell to the contractor—is one subject at least that is of ever vital interest to the jobber's salesman. Opinions which throw light upon that subject require no embellishing to make them interesting. For the problem is one which the jobber's salesman has a very personal interest in solving, yet never quite succeeds in doing.

The subject of course is without end. So it's not to be understood that the electrical contractors quoted here have even pretended to say the last word. However, they are all men who have achieved more than the average measure of success, and their opinions should be respected accordingly.

The comments which these men have made are meant to be impersonal; it is not the purpose to refer to, or criticize, any individual jobber or his salesman. So for that reason the names of these contractors are being withheld. For, otherwise, the comments might prove embarrassing to the jobbers with whom these men are known to deal.

From time to time, and as men can be found who have something constructive to say, there will be further quotations along these lines. To afford opportunity for the pot to call the kettle black is not the purpose of these interviews, and only such contractors as can see that by helping the jobber's salesman they also help themselves, will be invited to speak. And here, at least, are opinions from three contractors who are big and broad enough in their views to see their relationship to the jobber and his salesmen in its true light.

The first man interviewed is an electrical engineer who specializes in industrial work.

"Perhaps it is because the volume of my purchases is relatively small that the jobbers do not appear to put themselves out noticeably to serve me," he said. "But it is a fact, regardless of the reason, that I have my first time yet to be told of possible new business or receive a definite lead from an electrical jobber. I think that I should be very grateful to one who did serve me by co-operating in that manner.

"For some time past I have confined my trade to two jobbers. I get my quotations by phone, and my purchases usually do not go beyond pipe, wire, fittings and lighting fixtures. Motors, switchboards and panelboards, and the like, I find can be bought more satisfactorily direct. The jobbers I deal with cannot look after service complaints on motors and it's but seldom they are in the position to give information promptly regarding them.

"So far as motors go it is to my advantage in many ways to buy direct. And with regard to switchboards and panelboards, my specifications quite frequently call for those things to be made up specially; and again I can save time by dealing with the makers direct. For I find that the average jobber is not well informed on those matters and misunderstandings are frequent.

"As a general rule, I have been impressed with the fact that the men who take my orders over the phone and answer such questions as I call up the jobber to find out about are better informed than the salesmen who visit me. In fact, without wishing to appear cynical I might say that I have come to the conclusion that jobber's salesmen make calls only when they have changed employers and are out to get new trade for the new house.

"Also I think that I should topple over with surprise if a jobber's salesman ever inspected a completed job of mine

and then gave me some constructive suggestions regarding things he had noted which might have been better accomplished by using different means or materials. We engineers, you know, fall into the habit of specifying items of a certain make and type regularly, and sometimes it is true that there are newer makes available which we know nothing about. So I suspect that there are many occasions when mutual benefit would result through the salesman giving our work the once over.

"As I see it, one of the salesman's big responsibilities is to keep the customers of his house informed regarding the new things as they come out. But usually when salesmen do call on me they appear to have the idea that I'm posted right up to the minute and will mention the items which interest me. Naturally I'm not disposed to show my hand, but I'd listen, just the same, with the greatest interest to the man who voluntarily told me about the new things which he thought I should know about.

"Boiled down to a sentence, what I have said amounts to this: the jobber's salesman must put more effort into constructive selling and business building, if he is to escape the charge of being a mere order taker."

The next man interviewed is one of the active heads of a very large engineering and contracting firm doing a big business in a big way. He said: "Up until a few years ago we bought direct from the manufacturers, but finally Bill Goodwin's preachment and other causes brought us to look upon the electrical jobber as our nearest relative in business. We have been trading with the jobber ever since. But I'm dubious about my being able to say anything that will be very helpful to the jobber's salesman.

"Our orders frequently run into very big figures and the saving of even the fraction of a cent per foot on something or other means a worth while sum in the aggregate. So we make up our specifications very carefully and scrutinize the jobber's quotations with a microscope. However, I must confess that recollection of past favors or appreciation of services rendered has more than once tipped the scales in favor of a jobber whose prices were not the lowest.

"Therefore, my suggestion to the jobber's salesman who seeks business from a house such as ours, one buying in large quantities, would be this: I would recognize that getting business on a price basis solely is demoralizing, and I should endeavor to win out by giving better service than the others. Any shrewd salesman who studies his customer's business intelligently can quickly discover ways to earn the business friendship—and the personal friendship, too—of those he would serve. And I should strive persistently to earn a reputation among my customers for promptness, reliability and willingness to be of service.

"Given those counts in my favor, I would not lose any sleep over the other fellow's prices."

The third man approached is the head of a very aggressive firm specializing in house wiring.

"I have never given the matter any thought and there's not time to do so now. We have dealt with many jobbing houses in our time and found something to commend in each of them. But when I think back over the years it isn't apparent that the salesman himself was ever entirely the cause of our leaving one house, or patronizing another. Almost always, though, the salesman himself is a big factor in influencing such changes.

"Perhaps I can get at the thing the other way 'round, by mentioning what I would not do if I were a jobber's salesman.

"First, I should not create the impression when calling on a prospect that I did not expect to get an order any way and just dropped in to say hello.

(Continued on page 42)



BETTER MERCHANDISING



What Do You Mean— Overhead?

Too Often This is The Answer of the Small Contractor—This is the Second Article of a Series

By C. D. HENDERSON

The dictionary definition of **Overhead** is "above one's head" and it is unfortunately too true that the question of **Overhead Expense** goes over the heads of a great many contractor-dealers.

Although the trade papers have given considerable publicity to the matter during the past few years and it has been cussed and discussed at Association meetings time and time again, there is still only a hazy idea existing in our minds as to the fundamental principles behind it—What properly constitutes **Overhead Expense**—and an entirely wrong conception of the proper method of including it in the selling price.

The clearest explanation I have ever heard is:—**Any payment, obligation or expense contracted for that cannot be charged directly to the customer.** To make this clear—Suppose I sell a customer a tungsten lamp. I charge him for the lamp only, but indirectly, there should be included in this charge an allowance for the string and wrapping paper to tie it up with. Also a portion of my time, rent and a percentage of many other items which I am called upon to pay for in order to be in a position to furnish the customer with this lamp.

First, it is necessary to get a clear understanding of just what constitutes **Overhead Expense**. This done, the problem is more than half solved, as then it is only a matter of keeping track of these items, arriving at the correct percentage to include in the selling price.

My experience gained from investigating this question of **Overhead** leads me to believe that a lot of the trouble is caused by business men not including the **proper items in Overhead**. For instance, some contractor-dealers have members of their family keeping the books (without remuneration). Others take no regular salary. Others make no allowance for breakage, lost materials, tools, etc. Some keep no books at all and simply guess from day to day.

Here is a list of items that constitute **Overhead Expense**. It is fairly complete and might be reduced for some small concerns, but it will serve as a guide and possibly call some items to the dealer's attention which he has hithertofore overlooked.

Now the important thing to bear in mind is that every dollar we take in must bear a percentage of each of the above items. If my volume of business is \$30,000 for the year and the total expenditure on the above items is \$7,500, then my **Overhead Expense** is 25% on sales, or in other words, out of every \$1.00 I take in, I must lay aside 25c to cover **Overhead** and this is not making any allowance whatever for profit.

Space will not permit me enlarging on this, but in next

month's issue of the Electrical News, I purpose discussing that all important question of "How to Find the Selling Price."

Look for this article and see if it agrees with your ideas.

Items of Overhead Expense

Rent (shop, store, warehouse, garage, barn, office).
Light and Heat (store, warehouse, garage, barn, office).
Salary (Owner's salary that he could command as manager of a similar business).
Telephone and Telegrams.
Car, Truck or Horse and Wagon and Bicycle Upkeep.
Bookkeeper's Salary.
Stenographer's Salary.
Stockkeeper's Salary.
Office Boy and Delivery Boy.
Percentage of Foreman's Time Spent Fixing.
Insurance—Fire, Liability and Workmen's Compensation.
Taxes—Municipal, Business and Property Tax, Provincial, Federal Income Business Profit Tax.
Bad and Doubtful Accounts.
Allowance for Lost, Stolen and Defective Materials.
Labor Lost Replacing Defective Goods.
Lost Time in Shop Repairing Tools, Etc.
Interest on Capital invested at 6% and Interest on all loans.
Allowance on Accounts.
Advertising (Newspapers, Programs, Signs, Etc.).
Commissions.
Repairs for Tools.
Repairs around Store, Shop or Warehouse.
Depreciation on Office and Store Furniture.
Depreciation on Car, Tools and Machinery.
Trade Papers, Association Dues.
Stationery—Books, Printing.
Stamps, Ink, Pencils, Typewriter Ribbons.
Travelling Expense, Car Fares.
Collection Fees.
Legal Fees.
Donations.
Window Dressing Materials.
Licenses (Auto and Business).
And other items that cannot be charged directly to your customers.

Earle Electric, Limited, Handling Sweeper-Vac

The firm formerly known as the Earle Electric Company, and operating at 72 Nelson St., Toronto, has now been incorporated and will be known as Earle Electric, Limited. Under the efficient management of Mr. Gordon D. Earle this business has grown from small beginnings until it now covers from 66 to 72 Nelson St. The firm specializes on factory illumination and power work and on motor and general appliance repairs. Recently they have taken over the Ontario agency of the Sweeper-Vac cleaner, manufactured by the M. S. Wright Co. at Worcester, Mass., and distributed throughout the United States by the Pneuvac Company.

What Electric Appliance Has the Greatest Number of Uses?

The Electric Fan



For This Reason it Furnishes the Salesman the Greatest Number of Talking Points—A Wonderful Combination of Utility and Luxury

Jean and Mary were discussing the various styles of hair dressing. "By the way," said Mary, "how is it your hair is so fluffy and light and clean? My hair is just horrid—always oily and dirty looking. You couldn't make my hair look attractive if you tried for a week."

"I don't see why there should be any difference in our hair," replied Jean, "we are about the same complexion and our hair is about the same color: I shampoo mine quite often—perhaps you don't believe in doing that."

"Believe in it!" said the other. "Of course I believe in it but I can't afford to catch a bad cold and go to bed for two or three days once a week as I have to do every time I wash my hair. See what a mass of it I have; it takes 24 hours to dry out!"

"Twenty-four hours fiddlesticks—twenty-four minutes is all you need. My hair is just as thick and heavy as yours and I don't think I ever spend more than half an hour washing and drying it."

"Well, you must have some magic way of drying it for I am sure I am telling the truth when I state that my hair is often damp a whole day, and if the weather is not fine and warm I surely take cold."

"I wonder," said Jean, "how this can be? Of course you know the way to dry hair is with an electric fan; you have a fan in your home, I know—don't you use it?"

"Use a fan to dry my hair? I never thought of that. Do you? Is it a good idea? Is that how you get it all over in half an hour? I don't believe it can be done! How can a fan dry your hair anyway?"

"Well," replied the friend, "there's only one way to prove that I am right—try it. If your hair isn't dry inside of half an hour I'll stand you a banana split next time we meet."

The Public Doesn't Understand

It seems to be a fact that the public does not really understand that an electric fan has more than one use. They have the idea that it is to be used only in hot weather, and even then the average housewife or office manager will keep shutting it off for fear it will cost something to operate. The public needs to learn, first, that it costs nothing—practically nothing—to operate a fan, and second, that a fan has legion uses. An 8" fan uses about 30 watts; a 16" fan about 80 watts, 10" and 12" sizes being intermediate between these two figures. An 8" fan will consume a kilowatt-hour, therefore, in 33 1/3 hours. If the cost of current is two cents per kilowatt-hour—and in many cases it is less than one cent—the cost of operating the fan is a cent every seventeen hours.

Of course, it is very pleasant to have a breeze blowing on you on a hot summer day but the principle of the exhilarating effects of a fan is largely that it stirs up the atmosphere, relieving your languidness by carrying off the germ-laden air that surrounds your body, supplying you with fresh, pure air in its place. Of course,

if a person is perspiring, an electric fan also produces a cooling sensation by evaporating the perspiration. But it is doubtful if this fact is anything like as important as that of mixing the atmosphere—keeping it in motion.

If the general public—indeed, if electric dealers themselves—could once become obsessed with the importance of keeping the atmosphere constantly moving it would then be much easier to demonstrate that electric fans are just as valuable at every other season of the year as during the hot summer months.

In a word, if our dealers would grasp the idea, and would proceed to educate the general public accordingly, that the primary use of an electric fan is not to increase our comfort but is, rather, to increase our efficiency, we should have reached the stage where the sale of electric fans would just have begun.

Speaking recently before the Electric Club of Toronto, Col. Geo. Nasmith, the noted bacteriologist, described experiments that indicated that drowsiness and that general languid inefficiency that is so common nowadays is not due to impurities in the atmosphere, as is generally supposed, but to the fact that the atmosphere is stagnant. Dr. Nasmith showed that the best form of resuscitation in such cases was simply to set the atmosphere in motion. This immediately removed the feeling of languor or drowsiness. Scientific explanation of the result is not entirely clear but for the purpose of selling fans the fact itself is quite sufficient.

Then again, one of the difficulties in our homes during the wintertime is that of maintaining a proper temperature. How often we sit with cold feet and hot heads! A simple test would show us the reason for this, namely, that all the warm air in the room rises to the ceiling, the cold air being at the floor—a difference of several degrees through a range of seven or eight feet. Even in the severest winter weather when our houses seem uncomfortably cold, a temperature test of the air in the top of the room will reveal an entirely comfortable atmospheric condition.

The question naturally arises, "Why can't we just reverse this condition and have the warm air at the bottom and the cold air at the top, keeping our heads cool, so to speak, and our feet warm?" This interchange may not be a simple matter but, at least, it is quite possible to maintain an even temperature throughout. "How is it brought about?" you ask. Simply by the use of an electric fan which directs the warm air from the radiator downwards to the floor instead of allowing it to rise as it naturally does if left to itself. A fan placed anywhere in the room and set in such a way as to create a flow of air will show an immediate effect in evening up the temperature.

Again, one of the most useful and attractive devices that has ever been invented is a combination heater and fan in which the heat can be driven in any direction. For temporary heat or for auxiliary use in extreme weather this heater fan is, indeed, ideal.

And there are many other uses of electric fans for



CUT 2260

The Emerson Fan—McDonald & Willson are distributors for Emerson Electric Mfg. Co. St. Louis, Mo.



8" Hamilton Beach table or wall fan—The Canadian General Electric are exclusive Canadian distributors.



Canadian General Electric Co



CUT 2202

The "Northwind," an Emerson product sold by McDonald & Willson—Emerson fans carry a five year factory guarantee.



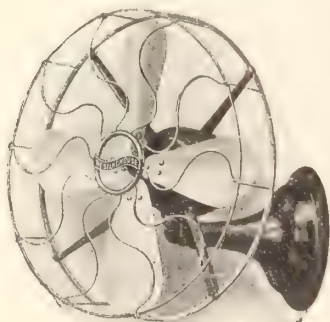
Canadian Westinghouse Ceiling Fan



Century Ceiling Fan, 58" blade sweep—Also made with electrolier—Century Electric Co., St. Louis, Mo.



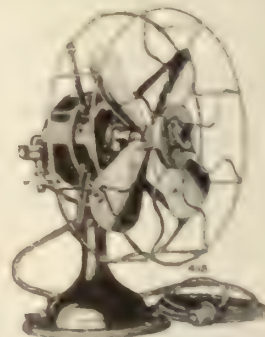
12" & 16" Century Electric Co. type adjustable for wall mounting—stationary or oscillating.



Desk and Wall Westinghouse Fan.



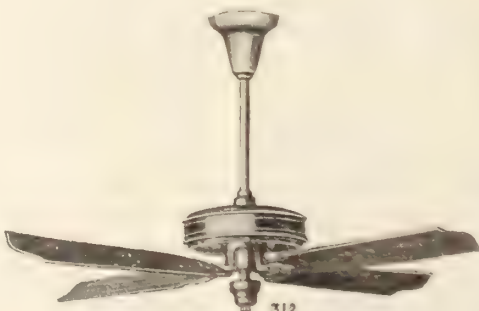
Style B, a.c. ceiling fan—Robbins and Meyers.



R & M 12" & 16" oscillating—
a.c., 110 v. and 220 v
d.c. 32, 110 and 220 v



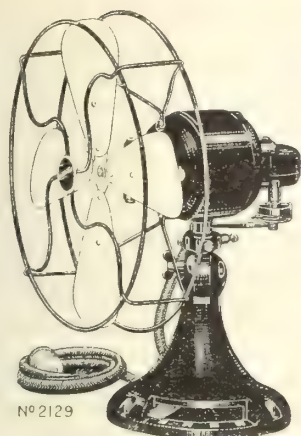
R & M 12" & 16" ventilating fan—
110 and 220 v., a.c.—32, 110
and 220 v., d.c.



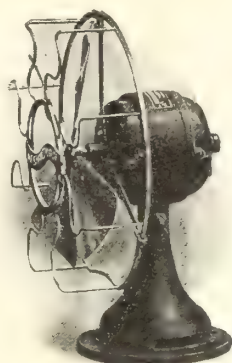
Style H, a.c. ceiling fan—Robbins and Meyers



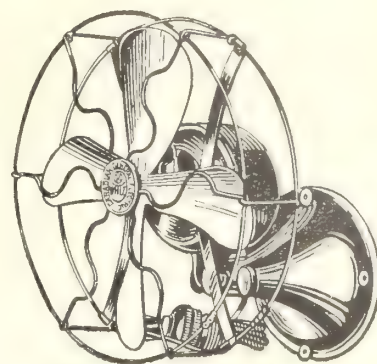
R & M 12" & 16" non-oscillating—
110 and 220 v., a.c.—32
110 and 220 v., d.c.



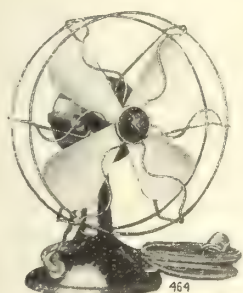
Four blade "Emerson" sold by McDonald & Willson, Toronto.



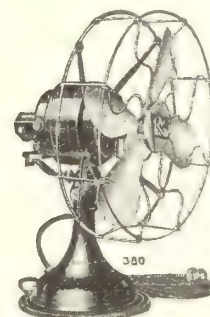
Westinghouse Fan—This company have discontinued their six blade fans for this year.



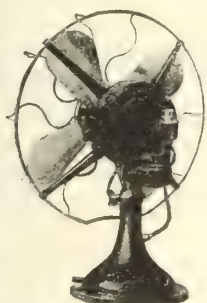
The "Whiz"—a C.G.E. product.



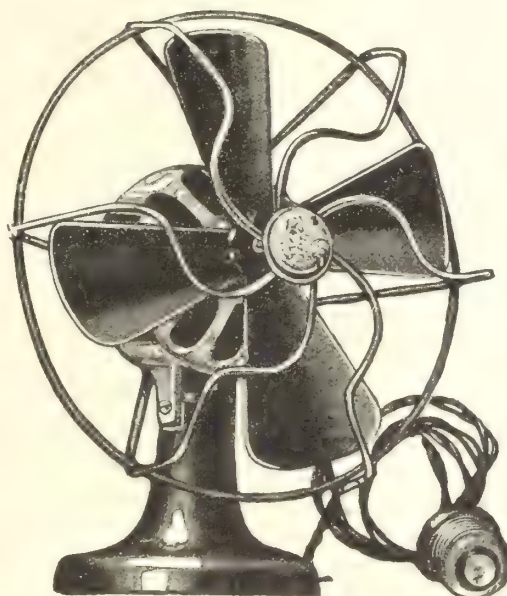
R & M 8" non-oscillating—110 v., Universal—220 v., a.c.—32 and 220 v., d.c.



R & M 9" oscillating—110 v., Universal—220 v., a.c.—32 and 220 v., d.c.



Can. Westinghouse Fan—A dull black finish for the blades and guards as well as the motor and base is a feature of Westinghouse 1921 fans.



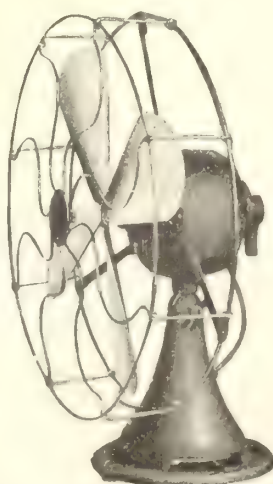
The "Polar Cub"—Product of A. C. Gilbert Menzies Co., Ltd.



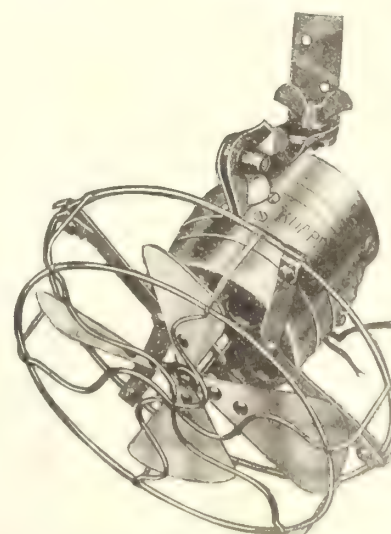
8" Hamilton Beach table or wall fan.



"Knapp" 8" fan in three voltages, 6, 32 and 110.



The "Peerless"—Manufactured by the Peerless Electric Co., Warren, Ohio.



6" fan for enclosed cars—The Limo-Sedan by Knapp Electric & Novelty Co., N.Y.

numerous, almost, to mention. One of the difficulties every retailer meets is cloudy windows caused by moisture condensing on them due to the difference of temperature outside and inside. A fan playing on the window or in the vicinity of the window, maintaining an even temperature in the neighborhood, is one of the simplest preventatives of this trouble.

And, speaking of windows, electric fans probably play a greater part in attractive window displays than any other single device.

One of the most attractive windows the writer has seen recently consisted of a number of artificial bluebirds suspended at various distances from the ceiling by invisible cords and very artistically grouped. An oscillating fan kept these birds in motion and formed a most attractive display which kept the attention of a large number of people constantly directed towards the window and the appliances displayed.

But, of course, during the months that are almost upon us—July, August and September—the electric fan will find its greatest usefulness in keeping us comfortable, and let it be remembered that its use is not only in the home, but in the office, store, restaurant and factory—wherever work is to be done and wherever efficiency is desirable. There is all the difference between a sleepy organization and a wide-awake one, yet two or three fans may make all that difference. There is all the difference between a well ventilated restaurant and the murky, clammy, offensive atmosphere one frequently finds—yet it is but the difference of two or three fans. During the summer months people will instinctively go for their meals, for their business appointments, for their purchases or to spend their leisure hours where they will find the greatest amount of comfort and rest.

It is a brave man who would predict the kind of summer that is before us, but, speaking generally, considering that we are having an exceptionally early and warm spring, it seems reasonable that we must have a long and, at least, moderately warm summer—perhaps exceptionally warm. The long season will, undoubtedly, mean a much greater number of sales of electric fans and we believe dealers will do well to lay in a fair stock as early in the season as possible. Because sales were slow last year is no reason at all why they should be so this year. Many excellent types are available, and we understand that in practically every case manufacturers are ready to make delivery and expect to be able to meet all demands. A few of the different designs are illustrated herewith. We urge Canadian electrical dealers to lay their plans for a vigorous selling campaign. In addition to satisfied customers they will create, fan sales will represent a nice profit in the aggregate with a minimum outlay of money and time.

And just one word in passing: fans lend themselves to demonstrations in a wonderful way. Let the customer see them in action—let him feel their cooling influence when he comes into your store or even as he passes by your door, hot and tired. Lay your plans for special fan window displays. Tie in a little bit of newspaper advertising with it and follow this up with telephone calls. There is probably nothing easier in the electrical world to sell than a fan and there is certainly no easier or better time to sell it than during the next three months.

Vancouver Electric Club Luncheon

Undoubtedly the most influential factor in holding the electrical industry together in the city of Vancouver is the Vancouver Electric Club. Although addresses on many different subjects are heard at these luncheons, it is the aim of the directors to try and procure speakers that will give the members hints and suggestions that will enable them to improve their business. At the regular weekly luncheon held

on Friday, April 22nd, three of the members, in the persons of E. E. Walker, sales engineer of the British Columbia Electric Railway Company; W. C. Mainwaring, district sales manager of the Northern Electric Company, Limited; and J. Lightbody, publicity manager for the British Columbia Electric Railway Company, addressed the club on the Merchandising Conference which the General Electric Company had held in Seattle on Wednesday, the 20th.

Mr. Walker spoke in general terms of the conference, bringing out also the stress laid on the fact that the high power Mazda C, or nitrogen lamps which are so commonly used to-day should be used with some sort of a reflector and should not be directly exposed to the eye. Nitrogen lamps give illumination, and nitrogen lamps plus proper reflectors give illumination service.

Mr. Mainwaring reviewed "Common Sense Merchandising," an address which was very ably delivered at the conference by Mr. Tom Casey of the Hurley Machine Company. The speaker said that "undoubtedly one of the first duties of the electrical retail trade would be to secure the services of the highest type of salesman if they wished to properly merchandise appliances. Combined with this they must see that their customers were given proper service if they wished to gain the good-will and confidence of the buying public."

Mr. Lightbody spoke on "Advertising" which was discussed very fully at the conference by Mr. T. J. McManus of the Edison Lamp Works. The speaker said that "it was the hardest thing in the world to induce the retail electrical trade to use newspapers in advertising their merchandise, and there was undoubtedly no cheaper method of reaching the thousands of people who are interested, than through this medium."

About sixty members attended this luncheon which was one of the most interesting and educative held for some time.

Merchandising Conference Held by the General Electric Company at Seattle, April 20, 1921

The Travelling Merchandising Conference which the General Electric Company have had touring the United States for the past six months, visited Seattle on Wednesday, April 20th.

For the benefit of all interested, two sessions were held in the "Orpheum Theatre." The first from 2 to 5 o'clock in the afternoon and the other from 8 to 10.30 o'clock in the evening. Fourteen different speakers of prominence connected with the General Electric Company, or its associate companies, took part in the conference, and their talks were supplemented by moving picture films, lantern slides and actual demonstrations of the merchandise which they were talking about.

Nothing of this kind has ever been attempted before and the General Electric Company are certainly to be congratulated on such a splendid merchandising conference which will undoubtedly help the electrical industry and those connected with it wherever it is shown.

Although the merchandise shown was all of General Electric manufacture, the ideas and suggestions put forth by the different speakers could be applied to the successful merchandising of any electrical appliance or apparatus.

About thirty members of the electrical industry in Vancouver and Victoria attended the conference, among those being Messrs. E. E. Walker, J. Priestman, J. Lightbody, J. S. Halls of the British Columbia Electric Railway Company; J. A. Fletcher and H. Pim of the Canadian General Electric Company; W. C. Mainwaring of the Northern Electric Railway Company; W. W. Fraser, R. J. Graham, J. Duck, B. Cope, Frank Cope, E. E. Brettell, G. N. Gardner, W. H. Slater. All of those attending were very enthusiastic over the conference and spoke of it in the highest terms.

City of Edmonton Educating the People to Use Electricity

The Light and Power Department of the city of Edmonton, Alta., recently issued a revised schedule of light and power rates. In distributing these to their customers they took advantage of the opportunity to address a letter to the citizens, urging greater use of electricity. The letter runs as follows:—

An Open Letter to Mr. and Mrs. Citizen:—

While in search of more comfort for your home, have you looked carefully into the advantages of a greater use of electricity? Are you aware that by the electrical method—

You can cook better and cleaner meals with no surplus heat, no dust, ashes, soot or smoke, with less labor and attention and at no greater expense than by any other method.

You can do your sweeping and cleaning quicker and with less labor, and so good that the annual or semi-annual "house-cleaning" becomes a "joke" and in addition to this, your house is clean all the time instead of once or twice a year.

The family washing can be attended to without the real hard labor required with hand operated washers and wringers, in addition to saving wear and tear on clothes.

The ironing can be done in the coolest room in the house, or in a shady porch or verandah, with less exertion and no time lost waiting for irons to heat.

Electric fans will ventilate the house and produce cool, refreshing breezes wherever required.

In many other ways electricity will reduce the labor and increase the comforts of the home. It means real service.

Lighten labor in the home.

Flood-Lighting of C.N.R. Terminal, Vancouver

Illuminated by means of reflectors placed in the top of the ornamental lamp standards in front of the building the Canadian National Railway Terminal at Vancouver is bathed in what appears to be "Flood Lighting." This method of illuminating the face of a building has never before been used in British Columbia. The lighting is estimated to have an effect of $1\frac{1}{2}$ foot-candles on the face of the building. Twelve 1,000 watt lamps are used. The lamps are so placed as to do away with objectionable spears of light striking either pedestrians or traffic.

Mr. A. Montgomery, electrical engineer with the C. H. E. Williams Company, who installed the lights, describes the unit as a standard type lamp, with an angle reflector with fixed focus, adjustable about 10 degrees. This is enclosed in a spherical globe of composite nature, the lower half being copper and the upper half glass. The whole is fixed in place on the top of the ordinary ornamental five-

light standard, in place of the regular top light and globe. These standards are set 27 feet apart along the front of the building.

The Dryer

The Laundryette Manufacturing Company, makers of the Laund-Dry-Ette, announce the recent publication of their new sales bulletin known as the DRYer. This little bearer of advertising and selling ideas will be sent from time to time each Laundryette dealer. It is a multigraphed affair and takes its name from the dryer, a built-in device on the Laund-Dry-Ette electric washing machine, which enables the user to entirely dispense with a wringer. The dryer is said to whirl the wet clothes wringer dry in one minute without handling or loss of buttons.

24 Hour Service Coast to Coast

An interesting folder has just come to the editor's desk, illustrating the offices, factories and warehouses of the Crouse-Hinds Company of Canada, Ltd., and the Harvey Hubbell Company of Canada, Ltd., and attention is drawn to the fact that these companies supply a 24-hour service from coast to coast. These factories are looked upon, among the trade, as models of efficiency and neatness, which is well borne out by the illustrations shown in this folder.

Electricity is Cheap—Use More of It

The Manitoba Free Press of April 30th, published at Winnipeg, has a very attractive electrical page headed "Winnipeg Has Cheap Electricity—Use More of It." As would naturally be expected at this time of the year when house-cleaning is the thought, sleeping and waking, that is uppermost in every housewife's mind, the advertisements are given over chiefly to vacuum cleaners but the advantages of other appliances, including the washing machine, the electric range, and the water heater are outlined. Among the editorial articles are the following: "Electric Ice-box Eliminates Labor"; "Adapters Remake Lamps and Vases"; "Experience Shows Low Bids are Unwise"; "Suite Has Everything Electric Except Canary Bird and Janitor." A prominent announcement states that "Winnipeg Uses More Electricity per Capita than any Other City in the World"; and that "This City has the Greatest Number of Electric Ranges Installed and in Daily Use."

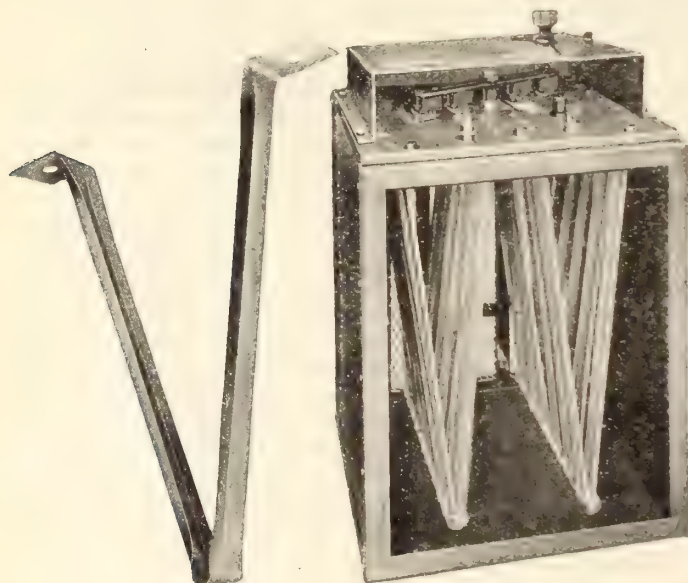
The electrical organizations in Winnipeg and Vancouver see to it that an electrical page appears frequently in the local press. There is no better way of assuring the interest and co-operation of the general public than by educating them in this way. It would be well if many more of our Canadian cities and towns would follow the same course.



Night view of Canadian National Terminal at Vancouver—A fine example of flood lighting

The Newest in Electrical Equipment

High current capacity rheostats which must dissipate comparatively large amounts of power are usually made with cast iron resistor units, cast in such form as to give a large radiating capacity. Cast iron has disadvantages when used as a resistor. For instance, it is heavy, breaks easily, changes its resistance considerably with temperature and disintegrates when subjected to repeated overheating. High resistivity alloys in ribbon form have the advantage of light weight and are not easily broken. However, as ordinarily used, there is some difficulty in supporting ribbon resistors so that they will not sag and short-circuit or burn off at points of contact. The Ward Leonard Electric Company has recently developed a ribbon resistor unit, called Ribohm, which is so designed as to utilize the strength of the material to such a degree that the complete unit is self-supporting. This unit is made by forming metallic ribbon into a trough or channel-shaped section which is flattened at both ends and in the middle. The unit is then bent about the middle

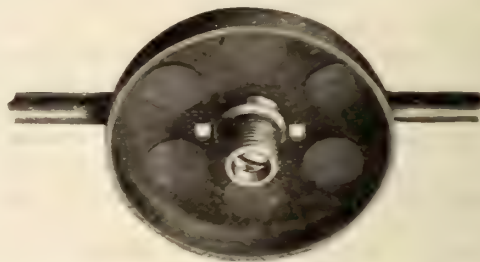


Ribohm—a ribbon resistor unit.

to form a "V" as shown in the accompanying illustration, and both ends are turned up to form supporting feet which permit the attachment of the unit to a suitable panel board. The complete resistor is made up of a number of such units connected in series or parallel. When connecting in series the units are mounted in zig-zag fashion, being joined at the feet where they are held in close contact by a bolt through the panel board. When they are used in parallel the connections are made by means of busbars which join the feet of the resistors so connected. The following comparison of Ribohm rheostats with cast iron grid rheostats intended for the same purpose is given by the company. A Ribohm resistor unit designed for 3 kilowatts continuous duty occupies a space of 10x10x12 inches and weighs 8 pounds; and a Ribohm rheostat with 12 steps designed for 9 kilowatts continuous duty occupies a space of 18x18x21 inches and weighs 80 pounds. A cast iron grid rheostat for the same service as given above would weigh about 230 pounds. Generally speaking, a Ribohm resistor weighs approximately 25 to 30 per cent of an equivalent cast iron grid resistor.

Banfield's New Outlet Box

Following the recent regulation of the Hydro-electric Power Commission of Ontario, regarding loom outlet boxes, W. H. Banfield & Sons, Ltd., are already in a position to supply the trade with the necessary equipment. The Banfield equipment is a shallow outlet box, in black japanned finish, with round cross-bar 18 in. long, flattened and punched



at each end for three screws or nails to fasten to the joists. The $\frac{3}{8}$ in. fixture stud is assembled on this cross-bar by having a hole drilled through it and a set screw in the front permits the box to be adjusted back and forth to obtain proper outlet centres. The outlet box is illustrated herewith. Banfield & Sons are now ready to make delivery; standard package contains fifty boxes.

Kollins' Electric Egg Beater

Many a man hereafter has had to force his favorite cake or dessert because mother or wife has lacked in endurance to accomplish the necessary beating of eggs or batter, or the whipping of cream. The invention of the Kollins' Electric Egg Beater offers to every busy housewife the opportunity of lightening the labor incident to the prepara-

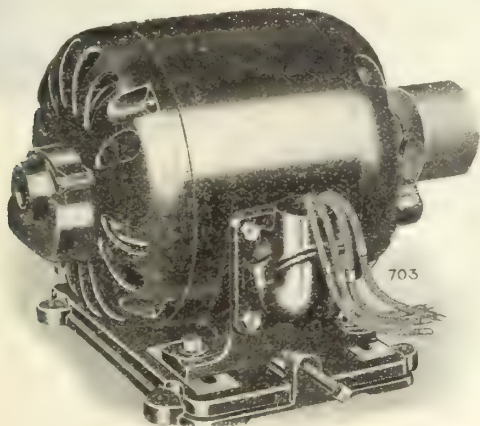


tion of such desserts. The makers claim that the beater may be used for beating eggs, creams, salad dressings or the preparation of light batters, such as waffles, sponge cake, omelets, fritters, griddle cakes, souffle, sauces, icings, etc. The machine is fitted with a Hamilton Beach motor, with special lever. All gears and bearings are of bronze, motor and gear housings are of cast aluminum and the entire mechanism is heavily plated.

Mr. C. Saville, representing the Northern Electrical Manufacturing Co., Standard Buildings, Lewis, Portland, is on a business trip to Canada.

New Repulsion Induction Type Motor

A new single phase motor of the repulsion start, induction type has recently been put into production by The Robbins & Myers Company. This motor is furnished for services which require high starting torque with low starting current. The motor starts as a repulsion motor. At full speed a centrifugal device operates, short circuiting each commutator bar and lifting the brushes and commutator from unnecessary wear. The action of this device is positive and does not depend upon play of the armature to push the brushes from the commutator. The interior of the motor is protected by ventilated enclosing end heads, a removable cover being provided on the commutator end for inspection of the commutator and brushes. The end head at the com-



mutator end is marked for the three positions of the brush rocker arm which gives clockwise and counter-clockwise rotation and neutral. Oil ring lubrication is used. The oil reservoirs are large and fitted with overflow gauge. By turning the end heads the motors can be adapted for side wall or ceiling mounting. When this is done the brushes of two and six pole motors must be shifted to correspond to the new position of the end heads. The average starting torque from rest is 350% of full load torque and the average starting current is 300% of full load current. The motor will bring up to normal speed a load of $1\frac{1}{4}$ to $1\frac{3}{4}$ normal full load. The maximum running torque is over 200% of full load torque. This motor, known as R & M Type "R" is at present furnished in $\frac{1}{2}$ h.p. size only, but other sizes ranging from $\frac{1}{4}$ to 1 h.p. will soon be in regular production.

Iceless Refrigerator for the Home

The modern housewife has at her disposal many conveniences. Scientific discoveries have been quickly adapted to lightening her labors, and such things as electric lights, vacuum cleaners and legion labor saving appliances are now regarded as indispensable.

But, up to the present time, and in the most important department of the household, the world has "marked time" and has tolerated the inconvenience of inadequate ice refrigeration—a state of affairs which need no longer exist since the appearance on the market of the electric refrigerating machine. Among others, a Canadian concern, the Toronto Laundry Machine Co., is manufacturing an electrically driven, automatic machine of this type; simple and small enough for home use, it should make sanitary and economical refrigeration possible in every home of average means. The refrigerant used is sulphur dioxide, the condenser is water-cooled, and the compressor is direct connected to the motor, which may be driven from an ordinary lighting circuit. Automatic control is secured by means of a thermostat and suitable accessory apparatus.

The hygienic superiority of such a machine is at once

apparent; as to economy of operation, the makers claim that records kept over a period of five years show that the operating cost is frequently less than 50 per cent. of the cost of ice. Troubles of the common ice box, such as fluctuating temperature and dripping drain pipes are eliminated and the unpunctual iceman is no longer needed.

The day seems not far distant when a cold storage machine will be considered indispensable in every household—one can foresee the time when we shall cool our houses in summer as we heat them in winter. The prospect of pushing a button and doing away with the sweltering heat of a July night, is pleasant, and the reality, perhaps, not far off. In the meantime the electrical kitchen is not complete without the iceless refrigerator; it saves food, saves steps and the cost of operation is negligible.

Electrical Egg Tester

A new and practical egg tester has been put on the market by the Stumpp & Walter Co., of New York. The device is so constructed that the placing of an egg upon the hood of the machine, as shown, causes a powerful light by closing the circuit of a lamp and battery. It is claimed



that 15,000 to 20,000 eggs can be tested without renewal of the battery. The features of the device are the ease with which it can be used and the improvement in penetrating power of the light used over that of kerosene.

I. E. S. Meeting May 18

The Toronto Chapter of the Illuminating Engineering Society will hold their first general meeting since organization in the assembly room of the Engineers Club, 96 King St., W., on the evening of Wednesday, May 18, at 8 p.m. The Executive Committee has in course of preparation an interesting article on Store and Window Lighting which will be presented by Mr. Frank T. Groome. A number of slides showing examples of good and bad local lighting will be shown; also a number of slides are being obtained from the parent society in Chicago illustrating some of the most recent installations in the United States.

Taking a Well Deserved Holiday

Electrical men all over Canada will regret to learn that Mr. Walter Warren, manager of the Central Electric Supply Company, is finding it necessary to take an extended holiday from his business on account of impaired health. Walter says he is not sick, but it is well known that during the twenty odd years that he has had charge of this company he has been one of the hardest and most faithful workers in the industry. The hearty good wishes of a host of friends for a splendid holiday and a speedy and complete recovery will go with him. In the meantime the business of the Central Electric Company is being taken over by the Masco Company. The policy, and the standard of service, for which Mr. Warren has built up such a splendid reputation, will be continued under the new consolidation, of which Mr. C. A. McLean will remain the head.

One of Hamilton's Fine Electric Stores



These illustrations show two attractive window displays recently put on by Culley & Breay, 85 King St. W., Hamilton. One of these windows was taken during a Eureka vacuum cleaner campaign and the other features general appliances. Culley & Breay change their windows every week, sometimes using a mixed display and at other times featuring one particular article. They sometimes put a washing machine in the vestibule, setting it in motion to attract the passerby and report to have received many inquiries from this source. Mr. Culley believes very firmly in changing his windows frequently.

The Jobber's Salesman's View of His Job—How to Sell the Contractor

(Continued from page 43)

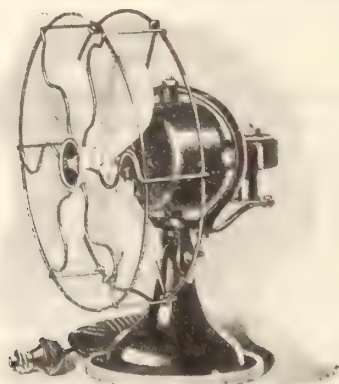
"Second, I should never make promises or statements about stock or deliveries unless absolutely sure of my ground.

"Third, I should never be too busy to go out with a

"Fourth, I should never take up a busy man's time chatting about things foreign to business.

"Fifth, I should never give a customer or prospect the impression that I had time to spare for anything other than business during business hours.

"Sixth, I should never allow a customer's question about merchandise or anything else pertaining to business go unanswered, even though I had to call up the house on the customer's phone to find out about it."



Menominee 9" oscillating—
R. E. T. Pringle.



On the left an 8" "Pittsburg" desk or wall fan. On the right a 12" oscillating fan. Pittsburg Electrical Specialties Co., United Import Co., Canadian Agents

customer and help him land business, if he appeared at all anxious to have me do so.

Handsome Warehouses and Stock Rooms of Crouse-Hinds Co. of Canada and Harvey Hubbell Co. of Canada



View showing service and advertising departments.



Section of model stock rooms.



Electric Railways

Toronto Transportation Commission Place Order for 160 Motor Cars and 60 Trailers

One of the largest street car orders—possibly the largest—that has ever been let in Canada was placed a few days ago by the Toronto Transportation Commission. The order includes the car bodies and necessary equipment for 160 motor cars and 60 trailers. The order for the car bodies and trucks went to the Canadian Car & Foundry Co., Montreal, while the electrical equipment will be supplied by the English Electric Company, the Canadian General Electric Company, and the Canadian Westinghouse Company.

Chief interest, so far as the general public is concerned, of course centers around the general design of the cars. In this respect the Toronto Transportation Commission would appear to have combined all the best features of the latest designs that have been produced on this and the European continent, taking advantage of the experience of all without following any particular type or design slavishly. The primary need of the city of Toronto is a street car which can be loaded and unloaded quickly, will maintain a more rapid schedule and at the same time provide a maximum of comfort for the riding public. To meet these ends, the designs of the car bodies and the electrical equipment have been most admirably chosen.

In the design of the cars a happy medium has been struck between the various systems of fare collection, namely, "pay-as-you-can," "pay as you enter" and "pay-as-you-leave." The plans, as indicated in the reproductions herewith, show that passengers enter the motor car at the front and leave at the centre; the conductor is also stationed at the centre. In this way the whole front half of the car becomes, in effect, a capacious loading platform. If they so desire, the passengers may all remain in this front end without passing the conductor; or they may pass the conductor and take a seat in the rear half of the car, depositing their fares, of course, as they go. For their own convenience and comfort it will work out that approximately two-thirds of the passengers will go to the rear of the car under normal conditions, thereby assuring that a majority of them deposit their fares while in transit, leaving the balance to pay as they go out, for the cars are so designed that the conductor is slightly nearer the forward end. Further, unless the car is close-packed, the passengers will naturally make preparations for alighting, and pass the conductor—depositing their fares—before the car comes to a stop. We thus have the combined advantages of "pay-as-you-enter" and "pay-as-you-leave" without the delays occasioned, by either.

The trailer differs in design from the motor car, though in effect the result is the same on the general public. The passengers enter by the more forward of the two centre doors and leave by the other. As the plan of the trailer shows, a railing tends to turn the incoming passengers into the front end, which becomes a large loading platform exactly as in the case of the motor car. Here again, those who wish may pass the conductor, depositing their fare, and take a seat in the rear portion of the car. In this case, too,

the Commission appear to have combined the advantages of both the pay-as-you-enter and pay-as-you-leave systems without the disadvantages of either.

The folding type of door is used at the forward end of the motor cars, but all other doors—that is, the exit doors of the motor car and both doors in the trailer—are of the sliding type; also, the front steps of the motor car are folding, all others being within the car and fixed in position. The floors of both cars are level. The control arrangements are such that the motorman cannot start his car until all doors are closed. The movement of the cars will be indicated by signal lamps—two Nichols-Intern lights in the rear—a red and a green—one to indicate "power off" and the car either stopped or slowing up, and the other to indicate "power on" and the car starting. A motorman's signal lamp will be located in the front vestibule and experiments are being tried out by which an opening in the back of the frame of this lamp allows the light to shine through and be visible from the outside of the vestibule. This opening will be covered with a lens or with colored glass, thus providing a signal to the traffic officer on the street corner. It is hoped in this way to overcome the delays that are often caused by the traffic officer signaling the motorman to proceed before he is ready to do so.

The lighting system consists of three circuits of five 36 watt lamps each in series.

Quite a good deal has been made of the fact, locally, that there is no contrivance on the rear end of these cars for carrying baby carriages and bicycles. It has been pointed out by the Commission, however, that this would be impossible for two reasons: (1) that the conductor is some distance away from this point and would be quite unable to assist in attaching or detaching carriages, and (2) that the delay due to waiting for the passenger to walk from the rear end of the car to the very front, a distance of some 60 ft. in the motor car, and to the middle of the trailer, a distance of some 30 ft., would disorganize any schedule.

As regards price, the Transportation Commission appear to have made a splendid bargain, the amount of the contract for the 160 car bodies being, approximately, \$1,270,000.

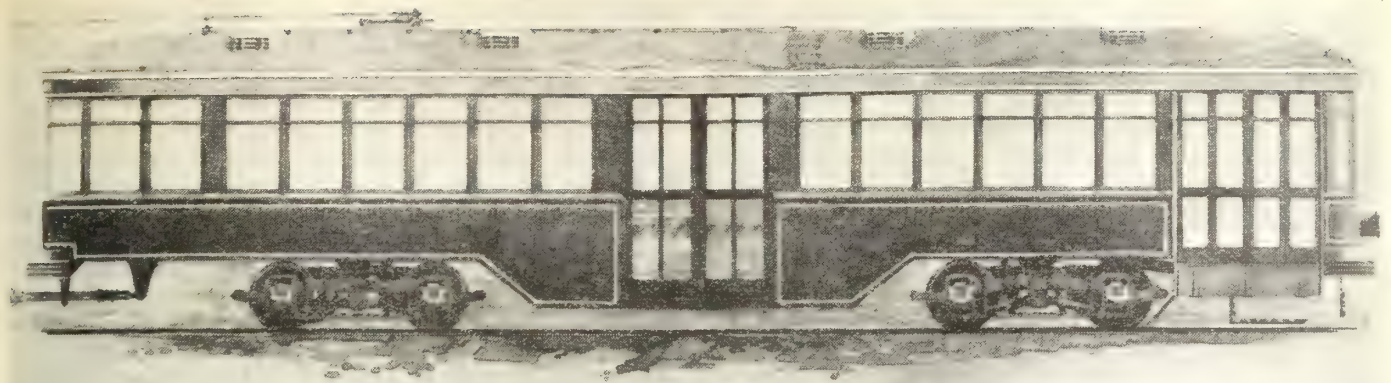
Dimensions and General Specifications

The dimensions of the motor cars are as follows: length over all, 51' 8"; width over all, 8' 6"; height, rail to trolley base, 11' 4"; seating capacity, 57; total weight, 49,000 lbs.; bolster centres, 26 ft.; truck wheel base, 5' 10". The bodies are all steel, interior trim of birch, head lining, agasote; arched roof.

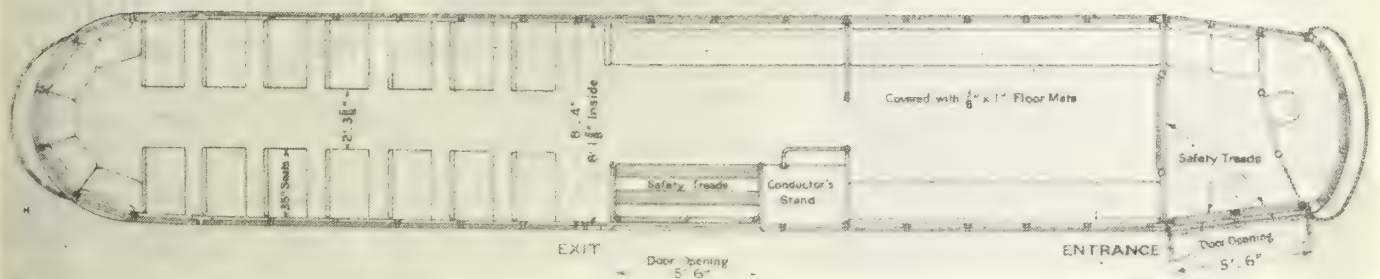
The trailer cars have a seating capacity of 61 and a weight of 28,000 lbs. The length over all is 49 ft.; width over all, 8' 6"; height, rail to roof, 10' 6¾"; bolster centres, 26 ft.; truck wheel base, 4' 2". Bodies are all steel; birch interior trim; agasote head lining; arched roof.

Electrical Equipment

The electrical equipment for these cars, as stated at the beginning of the article, will be provided by the English Electric Company, the Canadian General Electric Company and the Canadian Westinghouse Company. Each motor car has four motors, the equipment supplied being as follows:



51' 8" over Buffers

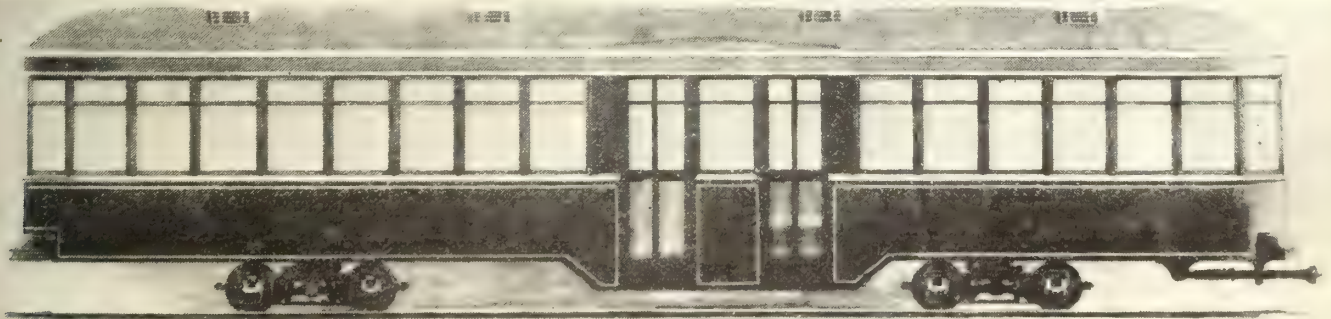


Motor Car—Seating capacity 57—Front entrance, centre exit—Toronto Transportation Commission

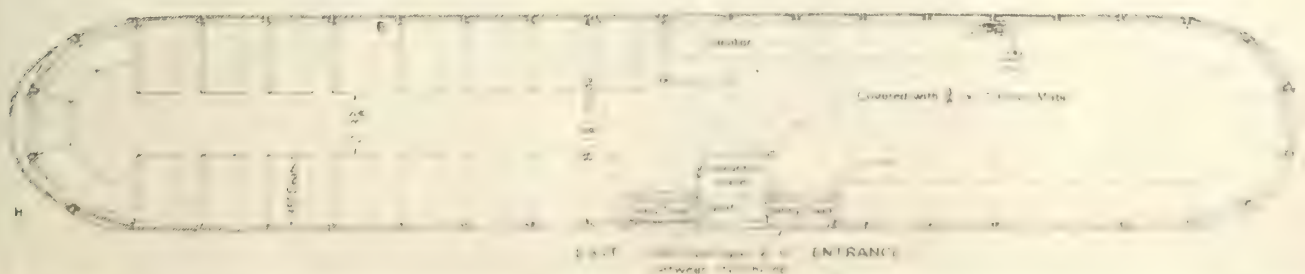
English Electric Company equipment No. 83, Canadian General Electric Company, 241-B; Canadian Westinghouse Company, 533-T-4. The lightning arrestors and the control are also supplied by these three companies along with their respective motor equipment.

It is of interest to note that the circuit breakers are to be placed beneath the cars instead of in the front vestibule, as has been usual in the past.

Other equipment of the motor cars is as follows: Canadian Westinghouse air-brake; sleeve armature bearings; A. E. R. A. forged axles; anti-climber bumpers; Consolidated car signal system; bronze car trimmings; roller side bearings; Tomlinson couplers; National Pneumatic Company door opening equipment; H. B. life-guards; "Tool Steel" and Nuttall gears and pinions; Peacock hand brake; Peter Smith heating equipment; sleeve journal bearings; C. C. & F.



41' 0" over Buffers



Trailer—Seating capacity 61—Centre entrance and exit—Toronto Transportation Commission

journal boxes; inside hung motors; enamel finish; air sander; wood slat seats, birch; American E. I. slack adjuster; lead-filled step treads; trolley catchers; U. S.-13 trolley base; C. C. & F. trucks; C-I 30" wheel.

The general equipment of the trailers corresponds to that of the motor cars, as outlined in the last paragraph, except that the wheels are 22" instead of 30".

Fully equipped, the approximate cost of the motor cars will be \$17,000.

Improved Car Wheel Lathe

Sometime during the war days, Mr. Freeman, the Commissioner of Public Utilities for the city of Lethbridge, Alberta, found that his street-car wheels were getting badly worn.

The usual procedure would have been to send the wheels and axles away, that the old wheels might be pulled off and new ones pressed on. This, however, would have been a very expensive process. The alternative of having the wheels turned down and fitted with steel tires also involved sending them away, as no lathe was available.

Mr. Freeman debated the matter, looked carefully over his scrap pile, and finally decided to construct his own lathe, with the happy result shown in the accompanying drawings.

The prize draws from the scrap pile were the pinions and gears. These gave him a suitable speed reduction from the driving motor to the wheel being turned.

The frame of the machine, as indicated, was built up of structural steel members. It was found that there was a good deal of vibration and the concrete was added as an after necessity.

It was an easy matter to make simple split bearings for

the gear shafts and wheel axles; remained, only the tool rest, which was made at a local machine shop.

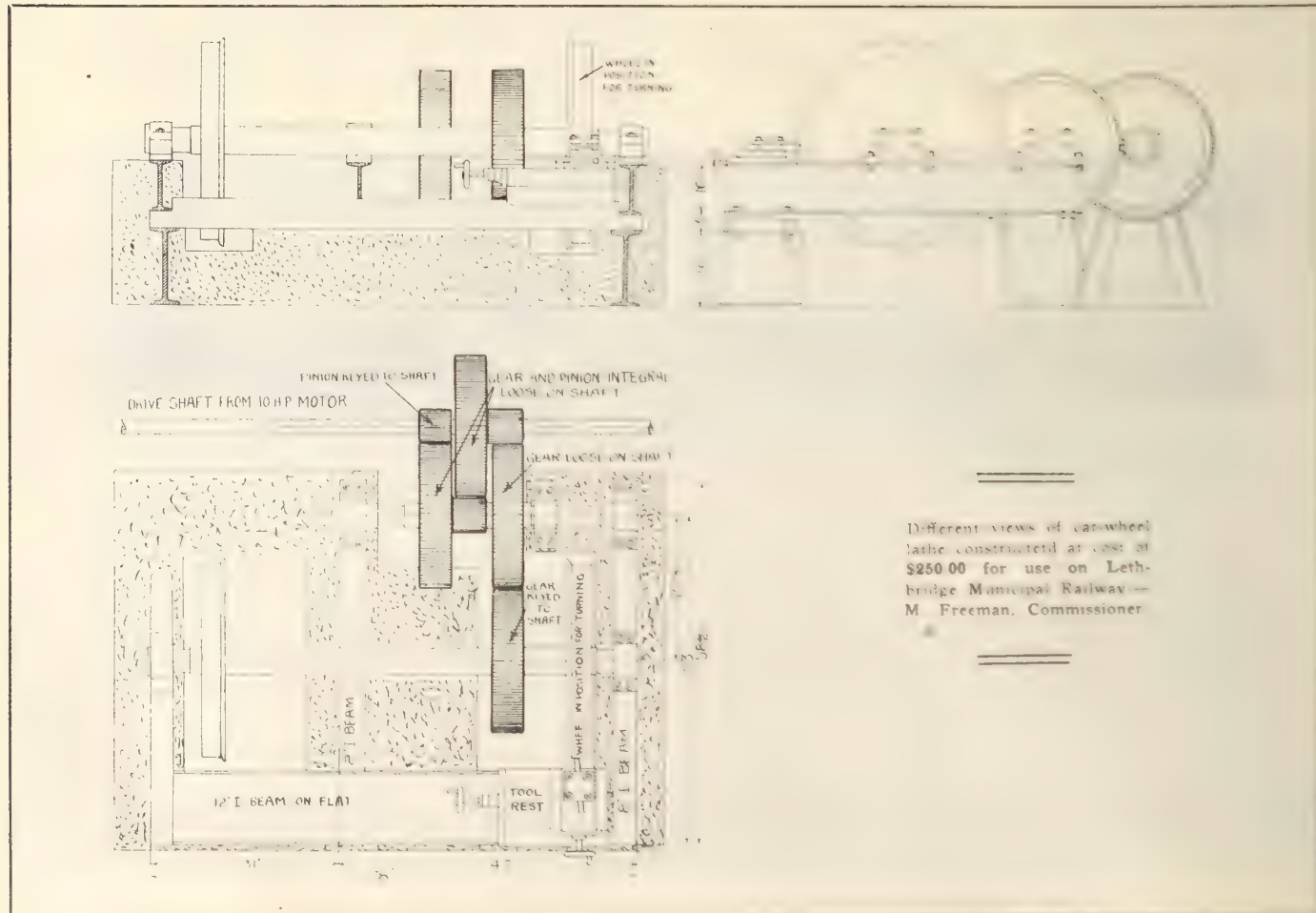
The rough, hard surface of the wheels caused a good deal of wear on the lathe tools, and finally a special 2 in. x 2 in. steel was obtained with which a $\frac{3}{8}$ in. cut could be taken.

The machine as it stands will look after 33 in. wheels. It is a rugged little tool with fairly uniform drive, no vibration and is reasonably free from eccentricity in cutting. The total cost of the machine ran about \$250, work on the bearings and tool rest costing \$150, the remaining \$100 going for labor, cement, etc. One man can turn up a pair of wheels with this lathe in a day, at a cost of \$8.00; Mr. Freeman states that it used to cost \$25.00 per pair and freight for 300 miles to have them repaired otherwise; the cost of new tires is a comparatively small item and it is only half an hour's work to remove an old tire and shrink on a new one.

Electrification of Montreal Harbour Terminal Well in Hand

The electrification of the Montreal Harbor Railway terminals, at present steam-operated and consisting of surface lines with a total trackage of 58 miles, situated between the Victoria Bridge and the Imperial Oil wharf, is now well in hand. About 42 miles of track will be in operation by next June, and the remainder, about 16 miles of track, from section 19, westwards, will not be electrified until later.

Electrification of the railway terminals was advocated for many years by Mr. W. G. Ross, president of the Harbor Commission, and it is largely due to his efforts and progressive policy that this undertaking is now successfully nearing completion. Early in 1918 the Harbor Commission realized that traffic on the railway terminals was increasing so rapidly



Different views of car-wheel lathe constructed at cost of \$250.00 for use on Lethbridge Municipal Railway—M. Freeman, Commissioner

that to avoid congestion it was necessary to procure more steam locomotives or to electrify the system. With the latter idea in view, a number of important electrified freight terminals were visited, and conditions closely studied, with the object of adopting the best system for the Montreal harbor terminals.

Investigation showed that electrification for freight yards and terminals was very economical and satisfactory in every way, electric locomotives being considerably more efficient than steam locomotives, and especially so in the winter time, there being no heat radiation. An electric locomotive is capable of drawing heavier loads up steeper grades, if necessary, than one operated by steam, the former having the whole capacity of the power house behind it, while the latter is limited to the extent of its boiler capacity. The elimination of the smoke and soot evils and the saving of coal were also important points considered. In view of the climatic conditions, it was decided to adopt the system in operation on the Mount Royal Tunnel of the Canadian National Railways, where a 2,400 v. d.c. overhead system is in use. Plans were accordingly drawn up on these lines.

Sufficient material to make a start was received in September, 1919, and a commencement was actually made on the 22nd of that month, construction being carried on steadily throughout the winter months on the overhead line work, as well as on the track. The overhead system is catenary construction, the cross-spans being supported by western cedar wooden poles where development is not completed, and by steel poles where permanent conditions exist. The steel and wood poles vary in length from 40 to 60 feet, depending on the width of cross-span and the nature of the embankment. The steel poles are set in concrete, which is carried well above ground level to protect the steel base. The cross-spans support the steel messengers which are placed above the track longitudinally and in turn support the trolley. The trolley is 4/0 grooved hard-drawn copper fastened by hangars to the steel messenger. The trolley is maintained at a uniform height of 23 ft. above the top of the rail. The system has been divided into approximately half-mile sections, each section being anchored and guyed independently from the adjoining sections. The pole span lengths vary from 90 ft. to 150 ft.; the cross-spans from one track to ten. Feeders will be carried from the power house to the various sections of the line, where sectionalizing switches will be installed to energize the different sections. All the rails have been bonded, the return circuit being by way of the tracks.

The electric locomotives will be of the enclosed cab type, 83 ton units, with double-end control. Double pantograph collectors, pneumatically operated, will collect the current from the trolley and convey it to the control equipment and then to the motors. Two locomotives will be in use to start with and as the system is developed additional locomotives will be secured.

The power house is a double-storey building situated centrally with the traffic load. The structure is of reinforced cement and steel with fancy buff brick facings. It will contain the synchronous motor-generator sets, transformers, switchboards, cell switches and control equipment for the railway operation, and approximately 2,000 h.p. of machinery for the operation of the cold storage warehouse. The incoming lines will consist of two 3-phase, 11,000 volts, 60 cycle, a.c. circuits. The current will be transformed down to 2,400 volts a.c., and converted to 2,400 d.c. for railway operation. The power for the cold storage plant will be transformed to 600 volts a.c. for the various motors, etc. Three switchboards will be erected, one for the railway apparatus control, one for the cold storage apparatus, and the last for lighting and general power work for that section of the harbor. The cell and remote control switches will be operated by motor or solenoids as found necessary, and a storage

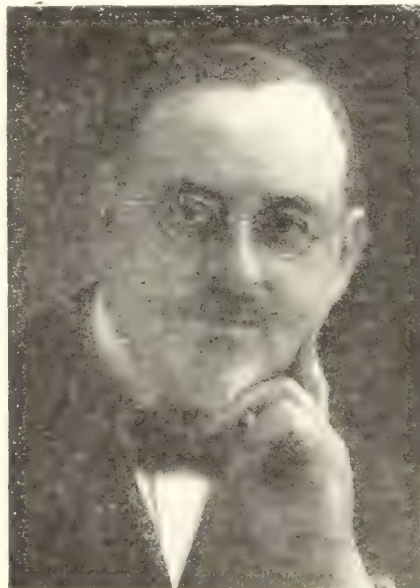
battery will be installed for the purpose of operating the automatic equipment and also for emergency lighting.

The Canadian General Electric Co. will supply the generators and part of the switchboard equipment and the Canadian Crocker Wheeler Co. the transformers.

The work is being carried out under the supervision of Mr. F. W. Cowie, chief engineer of the port, while Mr. T. E. Salter is the electrical engineer in charge.

Will Advise on Bus Situation

The Toronto Transportation Commission has retained the services of Mr. H. E. Blain, of London, England, to make a report on the motor bus and trolley bus situation as it refers to the city of Toronto. Mr. Blain is the assistant managing director of the group of companies which control motor bus operation, the tubes and underground railways, and certain of the surface railways of the city of London.



Mr. H. E. Blain

and is looked upon as one of the highest authorities in the world on motor bus operation. He is expected in Toronto in the early part of June. It would appear that the Toronto Transportation Commission has made a very wise move in engaging the services of so eminent a specialist before deciding for or against the expenditure of considerable sums of money on busses.

Re Electrifying Ten Miles of P. G. E. at North Vancouver

Regarding the recent suggestion of Premier John Oliver to electrify the ten miles of the P.G.E. extending from North Vancouver, through West Vancouver to Whyte Cliff, no definite action is at all likely this season. There has been no offer made to or by any one in authority, though the B. C. Electric Railway officials have been unofficially asked to look into the question in an advisory capacity. This particular section of the provincial government's railway, which as a whole is proving very much of a white elephant, will in all human probability never be connected up with the rest of the line for the simple reason that it would take nearly twenty miles of the very heaviest kind of mountain railway construction round the steep bluffs on the foreshore of Howe Sound to Squamish which is the tidewater terminus of the P. G. E.

Current News and Notes

Bonsecours, Que.

Messrs. Pettigrew & Lamontagne, 24 St. Nicholas St., Quebec City, have secured the contract for electrical work on a new school being erected at Bonsecours, Que., at an estimated cost of \$60,000.

Brantford, Ont.

The Hydro-electric Power Commission of Ontario has approved the issue of debentures to the amount of \$125,000 for hydro plant extensions. A bylaw authorizing this issue was passed by the Brantford City Council recently and passed on to the Ontario Municipal Board for further ratification.

The Inspection Department, Hydro Electric Commission, Commercial Chambers, Brantford, Ont., received tenders up to May 9 for the erection of an addition to the Greenwich hydro sub-station.

Charlottetown, P.E.I.

Tenders for electrical work will be received by the general contractor, Major Schurman, Summerside, P.E.I., up to May 30th, on a bank building to be erected at Charlottetown, P.E.I., for the Bank of Nova Scotia, at a cost of \$120,000.

Edmunston, N.B.

Messrs. Harry E. Marmen and George W. Larlee, electricians of Edmunston, N.B., have formed and entered into a co-partnership and will carry on an electrical contractor-dealer business in that town under the firm name of "Marmen & Larlee."

Fredericton, N.B.

Mr. E. S. Carter has been appointed to the position of secretary of the Board of Public Utilities Commissioners in place of Frederick P. Robinson, who formerly held this position.

Guelph, Ont.

The street car system of Guelph, Ont., is now in charge of the Ontario Hydro-electric Commission, having been taken over upon receipt of an Order in Council approving such a transfer. Plans regarding extensions and improvements will be announced in a few days.

Halifax, N.S.

Messrs. Arthur & Conn, Argyle St., have secured the contract for electrical work on a dry goods store to be erected on Hollis St. for Wood Bros., Ltd.

Messrs. Farquhar Bros., Ltd., Barrington St., have been awarded the contract for electrical work on an addition recently built to the Holy Heart Seminary on Quinpool Road at a cost of \$100,000.

Hamilton, Ont.

The Wark Electric Co., 50½ King St. E., Hamilton, Ont., has secured the contract for electrical work on a building on Main St., formerly used as a public library, which is undergoing alterations at an estimated cost of \$10,000; also on a bank building being erected for the Union Bank of Canada, corner Main & Lock Sts., that is undergoing alterations.

Kingston, Ont.

The H. W. Newman Electric Co., 167 Princess St., has been awarded the contract for electrical wiring on a residence and garage to be erected for Dr. E. B. Sparks, 195 Wellington St.

Kitchener, Ont.

The Star Electric Co., 22 Young St., have secured the

contract for electric supplies and wiring on a Y.M.C.A. building to be erected in that town at an estimated cost of \$150,000.

London, Ont.

Mr. W. Graham, 252½ Dundas St., has been awarded the contract for electrical work on a store building to be erected on Park Avenue for Mr. Jos. Dean, 434 Park Ave.

The London & Port Stanley Railway Commission will apply to the Dominion railway commission to arbitrate a new agreement between the L. & P. S. R. and the Michigan Central Railroad.

The Peoples Electric Company, 656 Dundas St., have secured the contract for electrical work on an addition and alterations being made to the Home for Incurables on Grand Avenue.

Montreal, Que.

The special general meeting of the shareholders of the Laurentide Power Company was held at Montreal on April 26, and the issue of \$1,500,000 twenty-year, seven per cent. general mortgage bonds was authorized. The money is to cover the cost of the installation of two additional units of 20,000 horsepower each. The work will be completed within the next few months.

Mr. F. J. Smith, 128 Peter St., has been awarded the contract for electrical work on a building at Duluth and St. Denis Streets that is being altered for a bank for the Royal Bank of Canada.

Escher Wyss & Company, Montreal, have recently been awarded the contract for two six-million Imperial gallon pumps and motors for the Peterborough Filtration Plant. The motors and switchboard are to be supplied by the Canadian General Electric Company Limited.

The Gunn Electric Co., 366 Dorchester St., W., has secured the contract for electrical work on a building undergoing alterations at the corner of St. John and Hospital Streets for the Scottish Life Assurance Co., at an estimated cost of \$15,000.

Nanaimo, B.C.

With the laying of the second submarine cable between Point Grey and Nanaimo on April 30th, additional telephone facilities are now available between the mainland and Vancouver Island. The new cable went into commercial use immediately after the shore end on Newcastle Island was connected up.

Ottawa, Ont.

Mr. Stanley Lewis, 60 Metcalfe St., has been awarded the contract for electrical work on a spare and engine building being erected on Bank St. for Mr. T. S. L. House, 105 Sparks St.

Mr. A. L. Florence, Rotilier St., Ottawa, Ont., will require electrical supplies needed in connection with a new residence just erected in that city at a cost of \$50,000.

Peterborough, Ont.

A Sunday street car service of twenty minute intervals and a ten cent fare was instituted in Peterborough on May 1st. The cars will be in operation from 9.00 a.m. until 11.00 p.m. It is proposed to continue this service until fall and if the reverse during the same season of conditions will continue.

St. Catharines, Ont.

Messrs. Bennett & Wright, 72 Queen St., E. Toronto, have been awarded the contract for electrical work on a

Memorial Chapel to be erected on the grounds of Ridley College, St. Catharines, for that institution.

The Clifford Electric Co., 21 Ontario St., have been awarded the contract for electrical work on a building being erected at 3 Bond St. for Mr. Frank Hoare.

Mr. G. J. M. Davis, of Thorold, Ont., has been awarded the contract for electrical work on a store building recently erected at the corner of St. Patrick and Marquis Sts., St. Catharines, for Mr. C. Daley, Geneva St.

St. Hyacinthe, Que.

Mr. J. A. St. Amour, 2171 St. Denis St., Montreal, has secured the contract for electrical work on a convent being erected at St. Hyacinthe, Que., at an estimated cost of \$300,000.

St. John, N.B.

Percy W. Thompson has been elected general manager of the New Brunswick Power Company. Mr. Thompson has been in Montreal on business connected with the one-man car which it is proposed to introduce into service in St. John. The street railway employees are reported as having given notice that they will not operate this type of car.

The Webb Electric Company, 91 Germain St., St. John, N.B., has secured the contract for electrical work on a dairy building being erected at 150 Union St., St. John, for Pacific Dairies, Ltd., Montreal, at an estimated cost of \$20,000.

Sandwich, Ont.

Mr. F. D. Reume, Sandwich, Ont., has been awarded the contract for electrical work on a residence being erected on Park Avenue for Mr. A. Westman at an estimated cost of \$15,600.

Stratford, Ont.

Mr. M. I. Higgins, 151 Ontario St., Stratford, Ont., has secured the contract for electrical work on a store building being erected in that town for the Gay Stores, Limited, at an estimated cost of \$14,000.

Sydney, N.S.

The Cape Breton Electric Co., on May 1st, made a reduction of from 8 to 10 per cent on the remuneration of all its employees, from the chief official to the lowest paid laborer. There will be no reduction in fares, however, the cut in wages, it is said, being necessary to allow of a reasonable profit in operation.

Tilsonburg, Ont.

A lineman on the Hydro-electric, Elgin A. Shieren, of Ingersoll, Ont., died in the Tilsonburg Emergency Hospital recently from burns received while repairing connections on a high voltage wire.

Toronto.

The McCrea Bill, which would have given power to the Ontario Railway Board to vary the fares on municipal street railways if they so desired, and which received strong opposition from many quarters, was defeated by a vote of 20 to 16 of the Railway Private Bills Committee.

Steps are being taken by the Northern Canada Power Ltd., to prevent a repetition of the power scarcity, which prevailed last fall in the North Country. A conservation dam is being erected at Kemoganissee Lake on the Metagami River, with a view to increasing the storage for the development of power.

The Ontario Power Co., of Niagara Falls, Ontario, has entered action at Osgoode Hall against the Niagara, Lockport & Ontario Power Co., of Buffalo, to recover \$73,353, balance with interest, alleged due for supply of electrical energy between the dates of January, 1918, and May, 1920. The total power bill was for \$1,596,863.65, and there has been paid on account the sum of \$1,523,836.09, leaving a balance of

\$68,027, which, with interest, brings the bill up to the sum sued for.

Mr. M. Nealon, 9 Glen Morris Ave., has secured the contract for electric wiring on a new school to be erected on Dufferin St., and another on Glenholme Ave., for the Separate School Board.

The Minister of Labor, at Ottawa, has established a Board of Conciliation and Investigation, as between the Toronto & Niagara Street Railway and certain of its employees. About 160 men are concerned, being members of the Electrical Railway Workers' Union. The dispute relates to general working conditions.

Mr. J. T. Bowles, 786 Danforth Ave., has been awarded the contract for electrical work on residences being erected for S. F. Lankin, 43 Hogarth Ave., on Milverton Ave., near Greenwood, at an estimated cost of \$50,000.

Mr. W. G. Renton, 400 Windermere Ave., has secured the contract for electrical work on five residences being erected on Durie St., near Bloor, for Mr. G. F. Cudmore, at an estimated cost of \$38,000. Also for four residences at 76 to 82 Durie St. for Messrs. P. G. & A. E. Clayton at an estimated cost of \$26,000.

Messrs. R. A. L. Gray & Co., 85 York St., have secured the contract for electrical work on an addition that is being built to the factory of the American Watch Case Company, 511 King St. W., at an estimated cost of \$20,000.

The O. B. & G. Electric Company, 95 Wood St., have secured the contract for electrical work on a residence being erected on Forest Hill Road at an estimated cost of \$25,000.

The Parsons Electrical Co., 135 Essex St., have secured the contract for electrical work on an addition and alterations to a building of the Toronto Theosophical Society at 52 Isabella St., now under way at an estimated cost of \$17,000; also for a service station to be erected at the corner of Shaw and Bloor St., for the Canadian Oil Companies, Ltd., at an estimated cost of \$15,000.

Truro, N.S.

The expenditure of \$23,000 for new electrical machinery was vetoed by the electors of the town of Truro, N.S., at a meeting of ratepayers on April 25th. In view of this vote, we are advised machinery will not be purchased this year.

Mr. E. W. Jeffrey, 627 Prince St., Truro, N.S., has secured the contract for electrical work on a school building to be erected on Alice Street, Truro, at an estimated cost of \$100,000.

Winnipeg, Man.

It is reported that the Winnipeg Electric Railway Company have been victimized to the extent of from \$12,000 to \$15,000 by employees through the sale of used tickets which were sold to unsuspecting citizens. Arrests have been made of some of the alleged guilty parties.

NOTICE to Manufacturers of Fuse Clips and Switches

We will let out on Royalty basis entire Canada to responsible concern the best electrical proposition on the market. Big demand for these patented reinforced fuse clips and switches.

Reinforced Switch & Mfg. Co.
516 Federal Street - Pittsburgh, Pa.

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Motors Wanted

WANTED—to buy D.C. Motors from 2 to 10 horsepower. Write Kaufman Rubber Co., Limited, Kitchener. 9-12

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1. Walter Clinton, Welland, Ont. 22-11

60 to 25 Cycles

Has your frequency been changed? A small advertisement in this section will sell your old equipment and put you in touch with new machinery. 9-10

Don Pedro Dam to be Built by Day Labor

After twice receiving and rejecting bids for the construction of the Don Pedro dam on the Tuolumne River, California, to store water for the use of the Turlock and Modesto irrigation districts in the San Joaquin Valley, a joint board has decided to have the work done by day labor instead of by contract.

The dam is to be built on a simple curve with a radius of 675 ft. It will be 280 ft. high, 975 ft. long on the crest, and will contain 266,000 cubic yards of concrete. Only about 10,000 cubic yards of excavation are said to be necessary to expose solid rock underlying the site, but about 120,000 cubic yards of excavation will be made in cutting a spillway channel in the canyon wall at the north end of the dam.

The construction program includes building a narrow gage railroad from the Southern Pacific line at Hickman to the dam site, a distance of 29 miles. About 12 miles from the dam site this railroad passes through gravel pits from which gravel for the concrete will have to be taken. It is estimated that

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT

Positions Desired and Vacant

Electrical Superintendent desires position; would consider a municipal hydro and waterworks connection, or an industrial plant electrical position; good references and can get results. Box 544, Electrical News, Toronto. 7-10

the work can be completed in two years time at a total cost of approximately \$4,000,000.

Professional Society Organized in Spain

Engineers of Catalonia, a province of Spain, have organized a professional society somewhat similar to the American Association of Engineers, under the title (translated) General Technical Society of Catalonia. Its present membership appears to consist largely of Barcelona men. According to a statement in its introductory bulletin, just issued, the society is organized for cultivation of the common interests of engineers, for participation in bringing about a solution of the "social struggle of our times," for contributing to the settlement of the conflict between employing and laboring classes, and for upholding the profession of engineering in public life. Manuel Vidal is president, Alejandro Homdedeu is secretary, and Manuel Escude is corresponding secretary. The addresses of the two latter are Calle San Salvador 61, and Calle Laforja 12, Barcelona.

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-11

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710	Wagner
" 1	75	3	25	550	480	Westg
" 1	60	3	25	550	750	Cr. Wh.
New 2	52	3	25	550	720	Lanc.
Used 2	50	3	25	550	720	Westg
New 2	35	3	25	550	720	Westg
Used 1	30	3	25	550	1500	Tor & Hm
" 2	30	3	25	550	750	F.M.
Used 1	25	3	25	550	750	C. G. E.
" 1	25	3	60	220	720	Cr. Wh.
New 1	25	3	25	550	715	Lanc.
New 1	15	3	25	550	1450	Westg
" 1	15	3	25	550	750	Lincoln
" 6	15	3	25	550	720	Westg
New 2	13	3	25	550	700	Lanc.
" 2	10	3	25	550	720	Westg
Used 1	7 1/2	3	25	220	1500	Tor. & Hm.
" 1	7 1/2	3	25	550	1450	C. G. E.
New 1	7 1/2	3	25	550	725	Westg
Used 1	7 1/2	3	25	550	700	Lanc.
Used 1	6 1/2	3	25	550	1440	Lanc.
New 1	5	3	25	550	1440	Excelsior
Used 1	5	3	25	550	1400	I & M
Used 1	5	3	60	200	1120	Westg
New 1	5	3	25	550	710	Wagner
New 3	3	3	25	550	1500	Lanc.
" 5	3	3	25	550	1400	Westg
" 4	3	3	25	550	1400	Excelsior
Used 1	2 1/2	1	60	110	1750	Wagner
New 2	2 1/2	3	25	550	1440	Excelsior
" 3	2 1/2	3	25	550	1425	Lanc.
" 1	1 1/2	1	25	110	1420	Wagner
Used 1	1	3	25	220	1500	Tor. & Hm
New 1	1	1	25	110	1440	Wagner
" 1	1	3	25	550	1425	Lanc.

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H. W. PETRIE, Limited
131 Front St. West - Toronto, Ont.

Contract Record
and Engineering Review

Mailed every Wednesday \$3 a Year
349 W. Adelaide St., Toronto



STEEL Switch Block

better than wood
Fits Flush, saves time
and labour.

No More Broken Blocks

For Sale by all leading
electrical jobbers or write
direct for samples

LESTER ELECTRIC CO. LTD.
St. Thomas, Ontario

MICA

Miners of finest Amber Electrical mica
Large stock of all grades always on hand

LARGE MICA A SPECIALTY

WALLINGFORD BROS. LIMITED

Offices at
Perkins, Buckingham, P. Q.
and Ottawa, Ont.

Mines at
Perkins, P. Q.

We have available for immediate shipment approximately 250 motors, mostly 3 phase, 25 cycle, 220 and 550 volt.

The following are a few of the bargains. We have many others equally attractive:—

Single Phase, 25 Cycle, 110 Volt.
4 1/8 H.P. Menominee, 1400 RPM., new, each \$ 32.50
2 1/4 H.P. St. Louis, 1400 RPM., new, each 40.00

3 Phase, 25 Cycle, 220 Volt.
6 2 H.P. Crocker-Wheeler, 1500 RPM., new, each.. 170.00
4 3 H.P. Crocker-Wheeler, 1450 RPM., new, each.. 200.00
3 5 H.P. Crocker-Wheeler, 1450 RPM., new, each.. 235.00
2 5 H.P. Robbins-Meyers, 1450 RPM., used, each.. 185.00
6 7 1/2 H.P. Crocker-Wheeler, 1450 RPM., new, each.. 420.00
1 7 1/2 H.P. Westinghouse, 1450 RPM., new, each... 420.00
2 15 H.P. Crocker-Wheeler, 725 RPM., new, each... 625.00
All above 3 phase motors have base and pulley.
7 1/2 H.P. and up have approved starters.

3 Phase, 25 Cycle, 550 Volt Motors without pulley, base or starter.

43 1 H.P. Westinghouse, 1400 RPM., new, each.... 135.00
10 10 H.P. Westinghouse, 1400 RPM., new, each.... 290.00
30 15 H.P. Westinghouse, 1400 RPM., new, each.... 360.00

3 Phase, 25 Cycle, 550 Volt, with base, pulley and starter.
3 7 1/2 H.P. General Electric, 1500 RPM., used, each.. 385.00
3 10 H.P. General Electric, 1500 RPM., used, each.. 415.00
1 15 H.P. General Electric, 750 RPM., used, each.. 560.00
1 30 H.P. General Electric, 750 RPM., used, each.. 575.00
2 40 H.P. General Electric, 750 RPM., used, each.. 925.00
1 50 H.P. Westinghouse, 750 RPM., new, each... 975.00
1 75 H.P. General Electric, 750 RPM., used, each.. 1275.00
1 100 H.P. General Electric, 750 RPM., used, each.. 1850.00

Miscellaneous Apparatus
1 Wagner Rotary Converter, 25 cycle, 220 volt, suitable for 2 moving picture machines 800.00
1 Motor Generator Battery Charging Set, 110 V., 25 cycle, A.C., 10 A., 30 V., D.C. 225.00

McNaughton-McKay Electric Co.

LIMITED

Telephone 4241

WINDSOR, ONTARIO

Motors in Stock

25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
1 10 hp. C.W. 750 rev., starter, rails, pulley.
1 5 hp. C.W. 1500 rev., starter, rails, pulley.
25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
1 13 hp. Lancash. 750 rev., starter, rails, pulley.
1 7 1/2 hp. Fairbanks 750 rev., starter, rails, pulley.
60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
1 20 hp. T.H.E. 1200 rev., pulley rails starter.
1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
1 7 1/2 hp. Westgh. 1200 rev., pulley, rails, starter.
1 7 1/2 hp. Ful. Wen. 1200 rev., pulley, rails, starter.
1 7 1/2 hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
1 7 1/2 hp. All Chal. 1200 rev., pulley rails, starter.
1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
3 1/2 hp. 1200 rev. clutch type T.H.E.
1 1 hp. 1800 rev. split phase Peerless.
1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
NEW SINGLE PHASE MOTORS in STOCK—REPULSION
2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
7 1/2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
5 1/2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
4 1/2 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
SPLIT PHASE
2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
2 1/2 hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 1/4 hp. Menominee 110 volt, 60 cycle, 1800 rev.
4 1/4 hp. Ohio 110 volt, 60 cycle, 1800 rev.
4 1/4 hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited

HAMILTON

ONTARIO

A. A. GIDDINGS & CO., LTD.

Montreal

Used Motors in stock which are of the newest types and have been in use a short time.
All thoroughly overhauled

3 Ph. 60 Cycle 550 Volt				3 Ph. 60 Cycle 550 Volt				Transformers			
No.	H.P.	Speed	Maker	No.	H.P.	Speed	Maker	Kw	Pri.	Sec.	Make
1	5	1200	G.E.	1	200	600	Allis-Chalmers	1/2	2200	220/100	Am. Trans. Co.
5	7 1/2	1200	G.E.	1	250	600	Westinghouse	1	"	"	Westinghouse
5	7 1/2	1200	Allis-Chalmers			2200 Volt		2	"	"	Moloney
10	10	1200	G.E.	1	100	720	C.G.E.	2 1/2	"	"	Am. Trans. Co.
10	10	1200	Allis-Chalmers	1	100	1800	Lincoln	3	"	"	Westinghouse
6	15	1200	G.E.	1	125	1800	Allis-Chalmers	3 1/2	"	"	Packard
3	15	1200	Allis-Chalmers	3	150	1800	G.E.	5	"	"	Packard
3	20	1200	Allis-Chalmers			Slip Ring 3 Ph. 60 Cycle 550 Volt		5	"	"	M.L.H.&P.
3	25	680	Allis-Chalmers	1	5	720	G.E.	5	550		Thawing
1	25	1200	Westinghouse	2	10	1200	Crocker Wheeler	5	550		Thawing
2	35	1200	Westinghouse	4	40	865	Allis-Chalmers	10	2200	550	M.L.H.&P.
1	50	600	Crocker Wheeler	4	40	865	Westinghouse	30	2200	220/110	M.L.H.&P.
2	60	1800	Burke	11	40	1200	G.E.	40	2200	220/110	M.L.H.&P.
1	60	1800	Allis-Chalmers	1	75	720	Crocker Wheeler				
2	75	720	G.E.	1	125	720	Crocker Wheeler				
2	75	1200	G.E.	11	175	600	Triumph				
1	75	600	Allis-Chalmers	1	200	600	C.G.E.				
				1	225	600 2200	Allis-Chalmers				

Back geared for low speeds.
† Vertical.
‡ 3 bearing.

Electrical Machinery

Repairing - Rewinding
Redesigning of Motors

And Now— Toronto Printers May Strike

THE present agreement between printers in book and job offices and employers in Toronto expires May 31. The minimum wage paid is \$35.20 per week (increased voluntarily a year ago by the employers from \$32.00, although the agreement had a year then to run). This wage covers a 48-hour week.

The International Union is demanding a week of 44 hours as the basis for all wage scales, and the Toronto unions are demanding a wage of \$44.00 per week of 44 hours, \$8.80 more per week for 4 hours less work.

This means an increase from 73 cents per hour to \$1.00 per hour, or over 36%.

Publishers and other employing printers feel that under present conditions of business and the admitted decreasing cost of living, the increased wages and shorter hours demanded by the International Union are unreasonable.

This is acknowledged by many of the thoughtful, loyal printers employed in the Toronto offices, who believe that the International Union has blundered in its demand that local unions shall not sign new agreements except on the basis of the 44-hour week.

The position, however, may be that these local men may not be able to make the International officers in Indianapolis see, that to force a strike now on these unreasonable demands would be an act of folly—and a strike may be called on June 1st.

The facts of the case are presented here, for the information of the sections of the public—subscriber and advertiser—reached by this publication.

The attitude of the employing printers is shown by their voluntary action in giving a 10 per cent. increase last year while the agreement calling for the minimum wage of \$32.00 a week had still a year to run.

They feel strongly now, however, that this is not a time when an increase of 36 per cent. in the labor cost of production should be permitted.

If publishers are forced to pay \$44.00 a week instead of \$35.20 and get only 44 hours of work instead of 48, it is inevitable that subscription and advertising rates must advance. No business can stand an increase in its wage bill of 36 per cent. and absorb that increase. The extra cost will have to be added to the sale price of the product.

Publishers sincerely hope that the great body of sane opinion among the local printers may prevail and that the Indianapolis (U.S.) officials will be induced to withdraw their unreasonable demands so that Toronto printers may continue to find well-paid, congenial employment.

If this sane, thoughtful opinion does not prevail, a strike seems inevitable, with its equally inevitable result of loss to the printers and publishers, and inconvenience and loss to the public.

An expression of the opinion of readers of this paper on the Union's proposals, involving an increase of 36% in the labor cost of printed matter, is asked. Will you not write a letter to the editor (not for publication) telling him your view of the situation.

This statement is published by and has received the endorsement of the Toronto publishers who are members of the

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The National Journal for the Electrical
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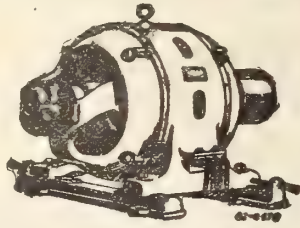
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Nine Reasons for Using the Robertson Patent Screw

FIRST—It is driven with about half the exertion required in driving the ordinary slot-headed screw, all the power used is concentrated in turning the screw.

SECOND—It does not require to be started with a hammer, and may be started and driven with one hand.

THIRD—It is impossible for the driver to slip out of the socket and cut the finger or disfigure costly furniture or woodwork.

FOURTH—The screw cannot wobble, as it is held fast in a line with the driver, and consequently goes in true and straight.

FIFTH—The screw lasts longer, as there is no wear on the head, this part will last as long as the body of the screw, which is practically indestructible.



SIXTH—Practically adapted for long screw driver and difficult work and can be driven in overhead work as readily as on the bench.

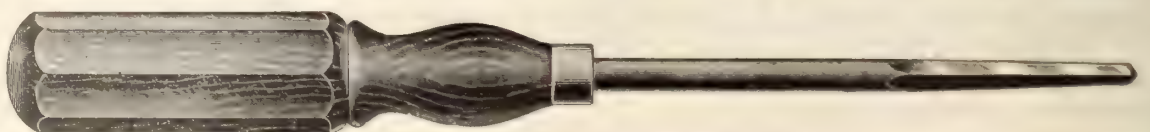
SEVENTH—For overhead work—electric wiring, or work in difficult places, it practically cuts the work in two and eliminates all danger of the driver slipping and coming in contact with live wires.

EIGHTH—It can be driven at any angle, because the screw fits the driver and becomes, as it were, one solid piece with the driver.

NINTH—It removes entirely the possibility of ragged looking heads, which are not only unsightly, but cut the hands and destroy the clothing.

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One of the
drivers
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STORAGE BATTERIES

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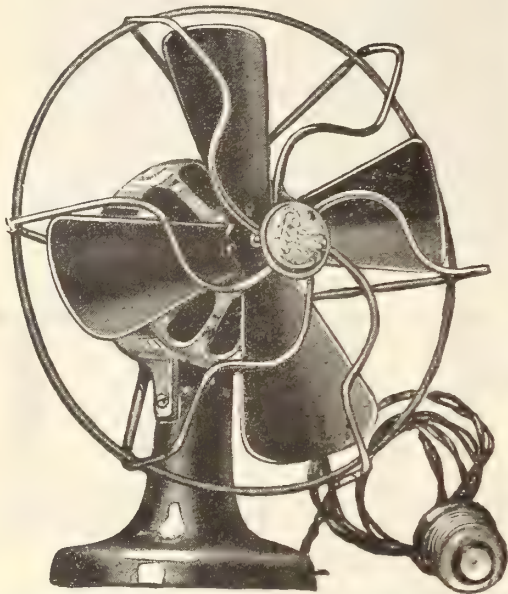
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ELECTRIC FAN



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Trolley

Hanger



is more easily installed and more
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The insulator, stud and yoke are separable, yet they assemble as a unit. When the trolley ear is attached and screwed up firmly on the stud, it can be twisted around at right angles to the span wire without loosening the ear on the stud.

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The insulator is made of durable glazed porcelain. The yoke is galvanized iron, the stud sherardized steel.

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**CARBON, GRAPHITE,
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Orders Shipped Promptly

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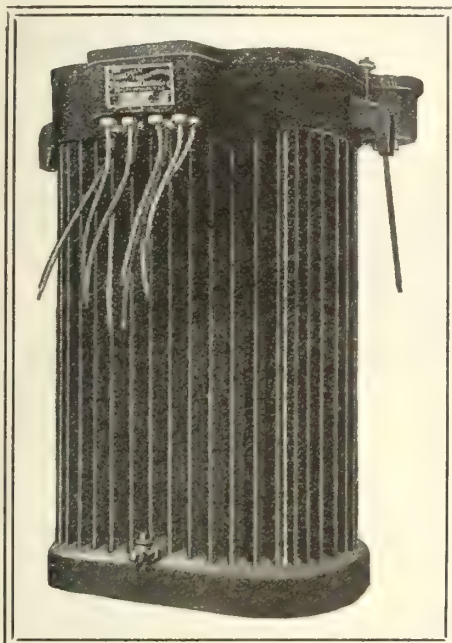
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PRESSED STEEL CASE

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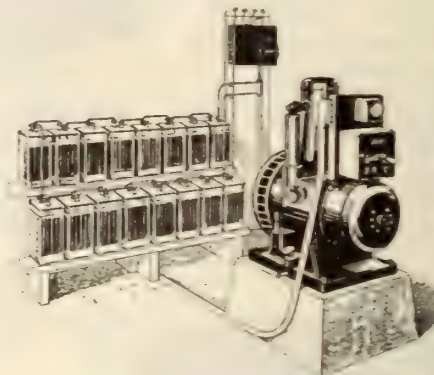
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Uniform in Structure.
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Means
Low Fuel Consumption**

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Rating—one K.W. (1000 watts) with a continuous overload capacity of 20% or more. 32-40 Volts. Direct Current. Battery of 160 Ampere hours, 8 hour rating. Horsepower $2\frac{1}{4}$, 3 S.K.F. Ball Bearings, Detachable cylinder head, Speed (under load) 1,000 r.p.m.

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By using our
OPEN TANK TREATED
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They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices. No obligation.

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Our "Fair List" No. 7
Gives Prices and Shipping Weights
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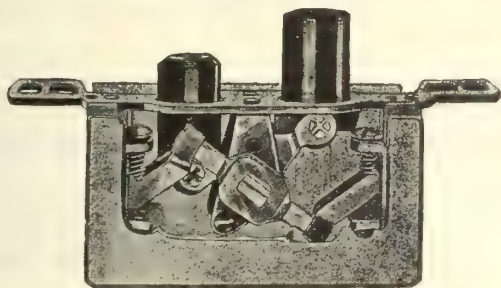
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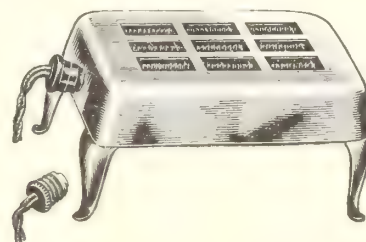
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"RED HOT"

—Electric—

HEATER and COOKER



What It Is

An electrical appliance made from cold rolled steel, nickel plated. It is seamless, well constructed and guaranteed for one year. Equipped with eight feet of cord and detachable plug. The "Red Hot" Heater is approved by the Hydro Electric Power Commission of Ontario, approval No. 33.

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As a cooker, it will toast, bake, boil or fry. As a heater it will serve the purpose as quickly and efficiently as any other expensive appliances that can only be used for the one purpose. Already used in Hotels, Homes, Restaurants, etc. An all the year round seller.

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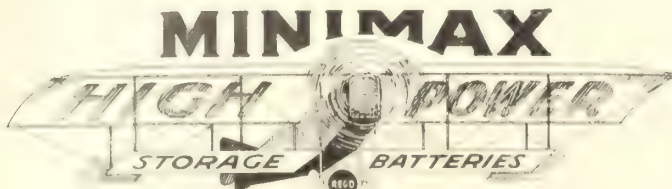
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This item can be cut to its lowest point right in the beginning by purchasing a machine with the electric motor attached—a Lincoln Electric Motor—scientifically fitted to its job by Lincoln Engineers.

Here are actual examples of the savings made by Canadian and U. S. machinery firms who are using Lincoln Motors.

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A manufacturer of a small electric hoist now gets 25% greater capacity on the same machine with no changes whatever in design—simply by installing Lincoln Motors of the size and type recommended by Lincoln Engineers.

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The largest manufacturer of a certain type of metal working machine is now using a 20 h.p. Lincoln Motor where he formerly used a 25 h.p. of another make. Further, his customers are paying about 50% less in power bills for the running of their machines.

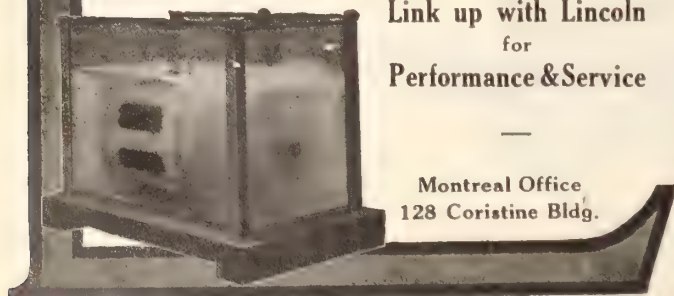
We are giving this same kind of service in Canada direct to motor users and motor driven machinery manufacturers.

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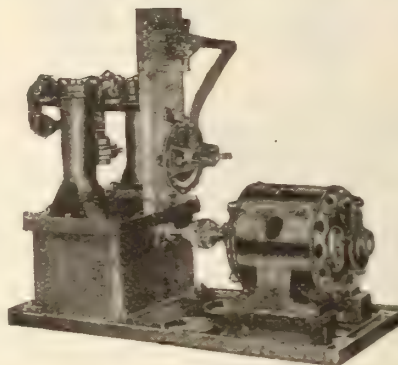
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1/2 H.P. Motor Direct Connected to a Heat Regulator

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The only practical patented device that will open and close any size links without injury to the finest finish.

It's like an extra man around the shop. Made of pressed steel, nickled.

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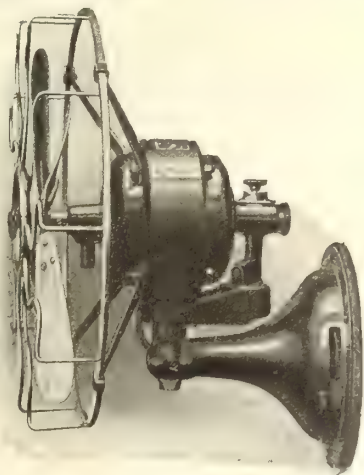
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Will save you money.

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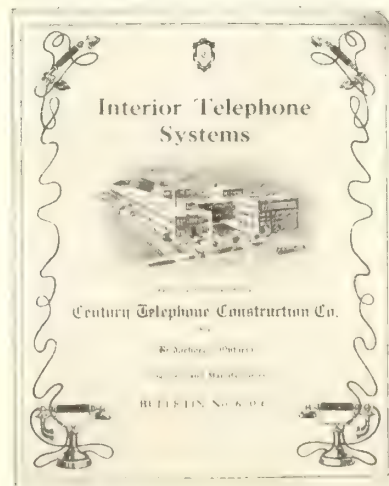
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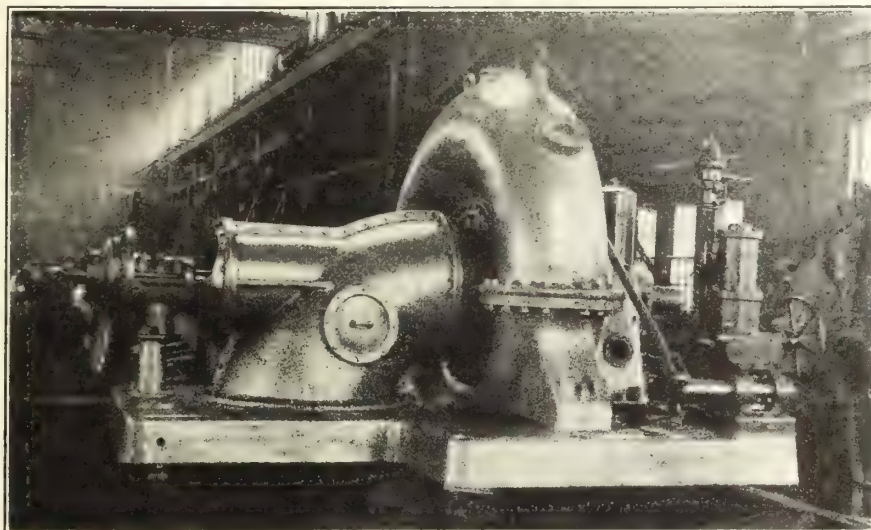
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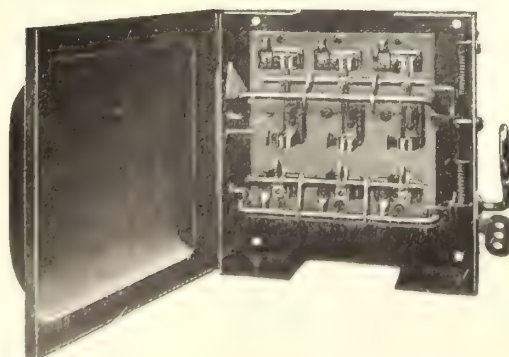
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International Machinery & Supply Co.
McGill Manufacturing Company

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Smith Company, S. Morgan

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Northern Electric Company
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NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

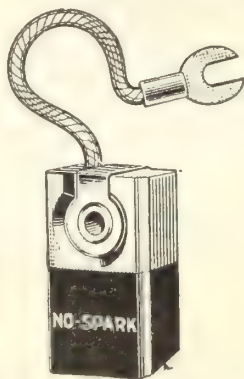
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They can't get knocked out or broken.



guards give your lamps just such protection.

Sold at a popular price. Our Loxon Lamp Guards and other Specialties demand the attention of

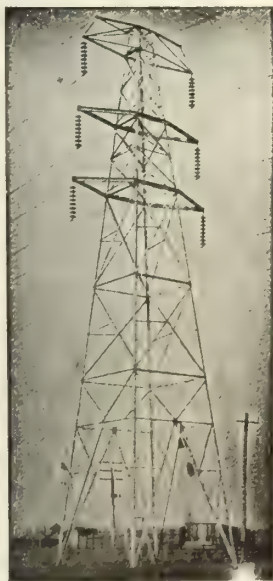
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The modern means of supporting overhead wires.

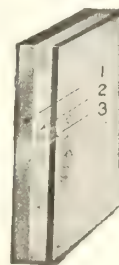
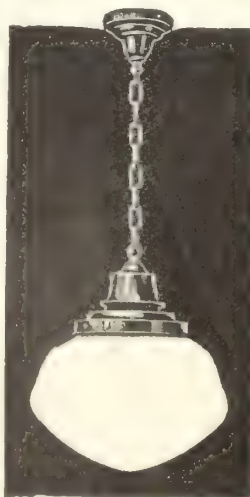
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We shall be pleased to furnish designs and estimates upon request.

Standard Tower of the Hydro Electric Power Commission of Ontario

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Structural Steel of all Kinds
Montreal Office in New Birks Building.

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Three Layer Glass

- 1 Clear crystal to provide body and strength.
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- 3 Rectifying layer of blue glass to eliminate excess red and yellow rays—producing a soft white light, near daylight.

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Celestialite Glass produces perfect eye comfort. There is no glare. Colors shown to advantage.

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In the Big Electrical Shops

Bakelite-Dilecto, the perfect insulation, is extensively used by large manufacturers of electrical equipment and its extreme physical properties also permit its use in mechanical applications. We manufacture Bakelite-Dilecto, Vulcanized Fibre and Continental Bakelite in sheets, rods, tubes and special shapes and Comite in sheets or rolls from .005" to .020" thick.

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"You can trust Griffiths' products"

Impregnating Varnishes

Coils, Wires, Armatures, etc., are thoroughly protected against moisture, oil, acids, alkalis, internal stresses, vibration, etc., by

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(CLEAR)

"OHMALINE"

(BLACK)

The Montreal Armature Works state: "We consider your Insulating Varnishes the best we have ever used in our motor and similar work, which includes 15 years' experience on all classes of work from the biggest to the smallest."

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**Increase Light
500 per cent.**

BY TEST

They are scientifically formed to obtain the maximum of light on the window trim. "Pittsburgh" Reflectors have attained extensive

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Illustration shows "Pittsburgh" Reflector No. 50 for 100 or 150 Watt Lamp. Dimensions:—Height, 9½ inches; Width, 10 inches. Holder, 2¼ in. Form "O."

Pittsburgh Reflector and Illuminating Co.

PITTSBURGH, PA.

Canadian Distributors

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Built to Higher Standards

The longer life of Oshkosh Construction Tools is due to the better materials and workmanship that go into them.

OSH KOSH

CONSTRUCTION TOOLS

are produced from finest grade steel and wood, by men long skilled in the work. Before it leaves the plant, each tool is subjected to a triple inspection. It is because these higher standards have always been maintained that more Oshkosh Tools are sold than of all other makes combined.

Ask your jobber

OSHKOSH MFG. CO.

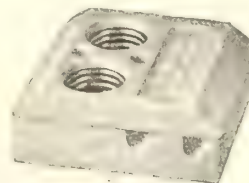
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Single
Branch



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D. Pole
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Westinghouse Fans

We assist electrical dealers to overcome sales hesitancy with attractive literature, consisting of a folder for the home to go direct to the user; folders for business prospects; and a beautiful colored five-panel window trim.

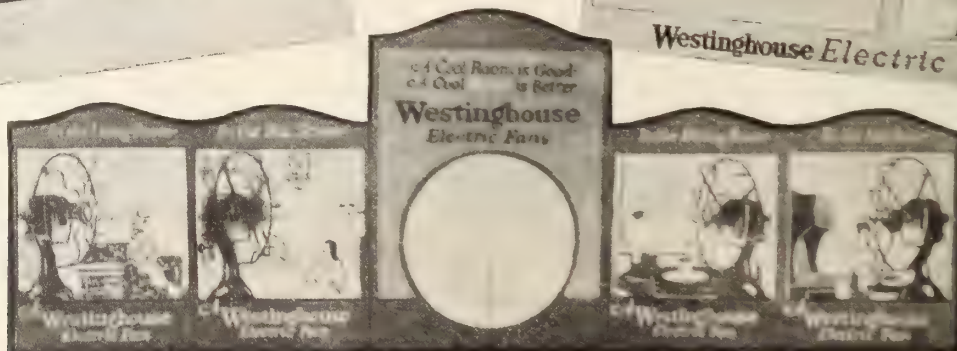
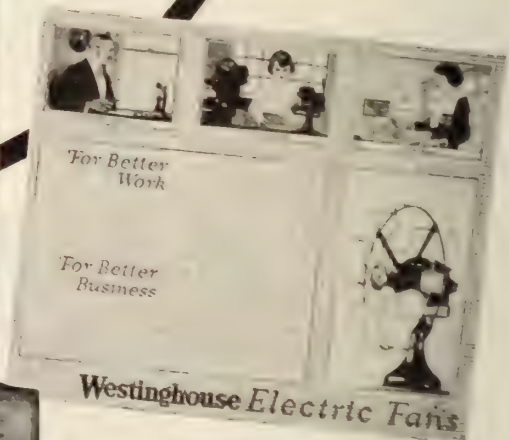
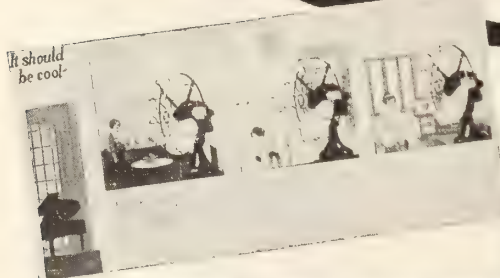
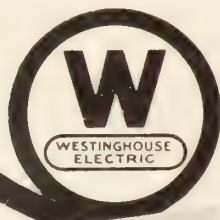
These and other helps, make up the Westinghouse contribution toward greater fan sales for the coming season.

You should have "Fan Facts for Fan Sellers" a small, but very important part of our sales campaign.

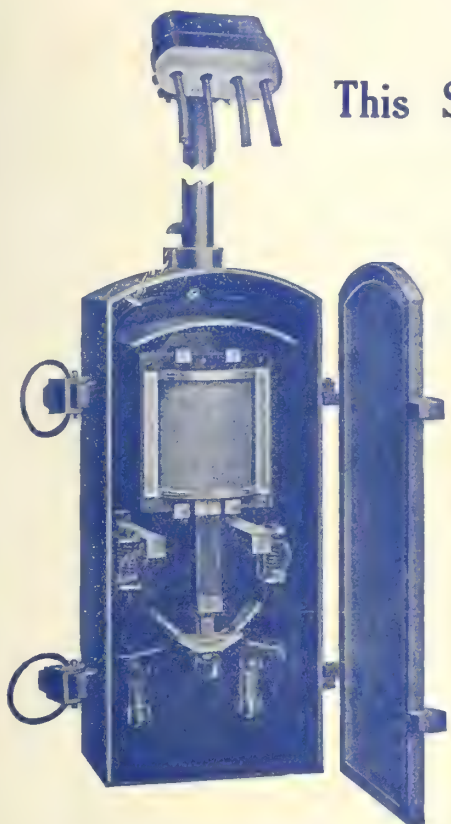
Order your fan needs early and get an early start in fan sales.

Canadian Westinghouse Co., Ltd.
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Westinghouse



**This SOLENOID SWITCH has been adopted
by the Hydro Electric Commission**

**They use it for
STREET LIGHTING**

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

Write for complete descriptive particulars

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Made Safe**

*Approved by the Hydro-Electric Commission of Ontario
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(GALVANIZED)

**For All
Electrical
Installations**

**Manufactured by
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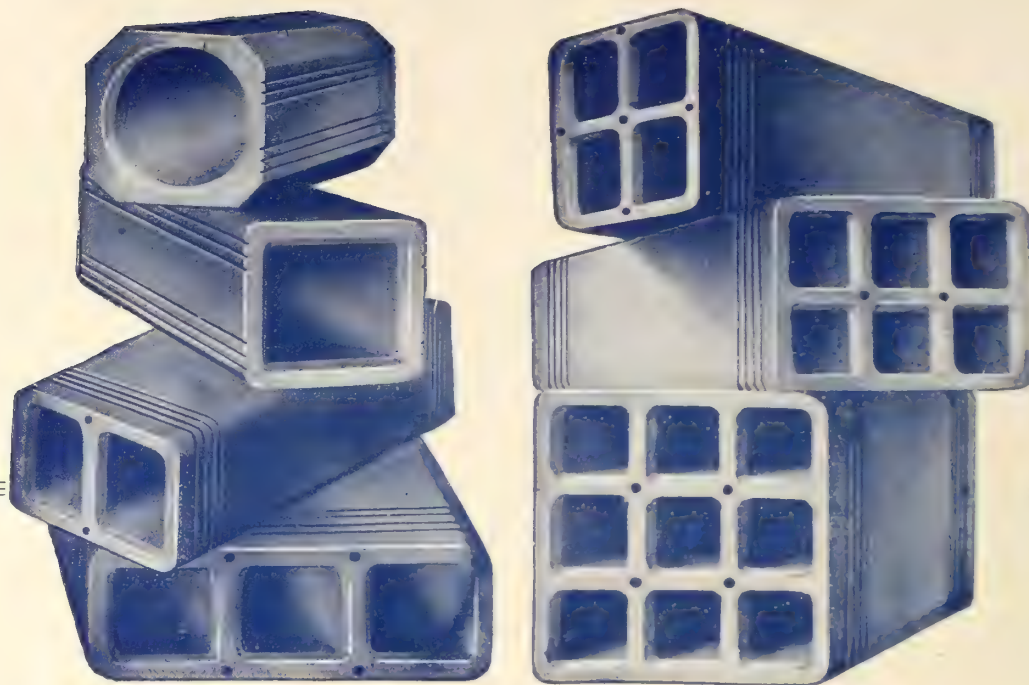
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Vitrified Clay Conduit for Low Maintenance Costs

Permanently resisting the forces of nature, Vitrified Clay Conduit shows a saving in maintenance costs that completely overshadows initial outlay. It is the one duct to successfully withstand the degenerating effects of friction, heat, alkali, acid solution and all other influences at work underground.

Vitrification does it, by converting the clay mass into a stone-like substance during the process of burning. The clay particles lose their individuality, becoming one impervious mass resisting all degenerating and eroding elements as effectually as a fine-grained rock.

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on your requirements*

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Wiremold



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Flashlights



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Trade-marks Representing Quality Products

IT GIVES us genuine satisfaction to be associated with the companies represented by these well-known trade-marks.

Each trade-mark stands for a quality product of the highest grade that has long since established its worth wherever electrical work is done.



Gongs



Wiring Devices

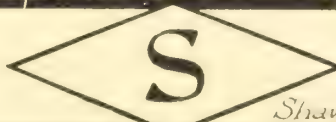


Northern Electric Company LIMITED

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HALIFAX	TORONTO	WINNIPEG	EDMONTON
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Wiring Devices

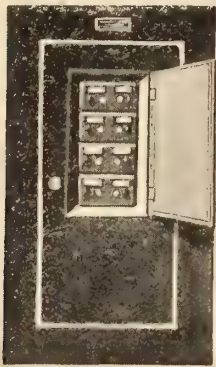


Shawmut Fuses

BENJAMIN PRODUCTS



Good light is as important as good air
—the human body requires both, but
if either one is bad, health and effi-
ciency are impaired.



LIGHTING EQUIPMENT for small or large factories
of all kinds,

Pulp and Paper Mills,
Textile Mills,
Oil Refineries,
Chemical Plants,
Railways,
Warehouses,
Yards,
Etc.

Good lighting is not expensive. It pays for itself with saving effected by better and more work and less work spoiled, saving of time, and fewer accidents.

Information and advice freely given. Send us particulars of your case at once.

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TORONTO

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MONTREAL

311 CONFEDERATION LIFE BLDG.
WINNIPEG

Fibre Conduit keeps cable sheaths safe

Read why the smoothest cableway is both safe and cheap

THE real value of any underground conduit depends on its ability to serve and protect the cable sheaths. And Fibre Conduit has no superior in this regard.

The smoothest cableway

The inside of Johns-Manville Fibre Conduit is a continuous smooth tube, whose joints can be made gas and water-tight. Cable can be pulled through with the minimum of effort and without cutting or abrasion of lead sheaths. This elimination of damage during installation prevents probably nine-tenths of the troubles to which cables are ordinarily subject.

The strongest cableway

The remarkable mechanical strength of Johns-Manville Fibre Conduit enables it to stand shipping, cartage and handling with ease.

Yet for all its strength, Johns-Manville Fibre Conduit is relatively more flexible than ceramic materials; a decided advantage where settlement is apt to occur. Moreover, Johns-Manville Fibre Conduit will not warp, split or scale.

The durable cableway

Johns-Manville Fibre Conduit has been in use about twenty years and, where properly laid and surrounded with concrete, has shown no signs of deterioration. There is, indeed, nothing in the

composition of Johns-Manville Fibre Conduit that can be affected by earth salts or the acids that may result from seepage from streets and highways. It is dense, non-porous, frost-proof, water-proof and fungus-proof and cannot, therefore, rot or corrode.

The best electrical protection

After immersion in water for 200 hours, Johns-Manville Fibre Conduit with $\frac{1}{4}$ inch thick walls, indicates an average puncture test of 24,000 volts, and when dry an average of 32,000 volts. A striking proof of insulating efficiency.

And because Johns-Manville Fibre Conduit is not inflammable, there can be no spread of fire in case of arc or flash. The severest temperature, voltage and short circuit tests have demonstrated that Johns-Manville Fibre Conduit will stand up under extremely severe conditions.

The cheapest cableway

Johns-Manville Fibre Conduit is much cheaper than ceramic materials to buy, and it is cheaper to install because of its lightness, simplicity, strength and adaptability to grade changes, curves, etc. The longer length of each section saves time and expense in laying and reduces the number of joints.

Ask the nearest Johns-Manville branch for the handbook on underground conduits—it contains facts that you should have before you install any cableway.

CANADIAN JOHNS-MANVILLE CO. LIMITED

Toronto Montreal Winnipeg Vancouver
Hamilton Ottawa Windsor

Changing the level of a completed installation of Johns-Manville Fibre Conduit. The work was made necessary by a change in street grading and was successfully accomplished without even removing the cables.



Through—

Asbestos

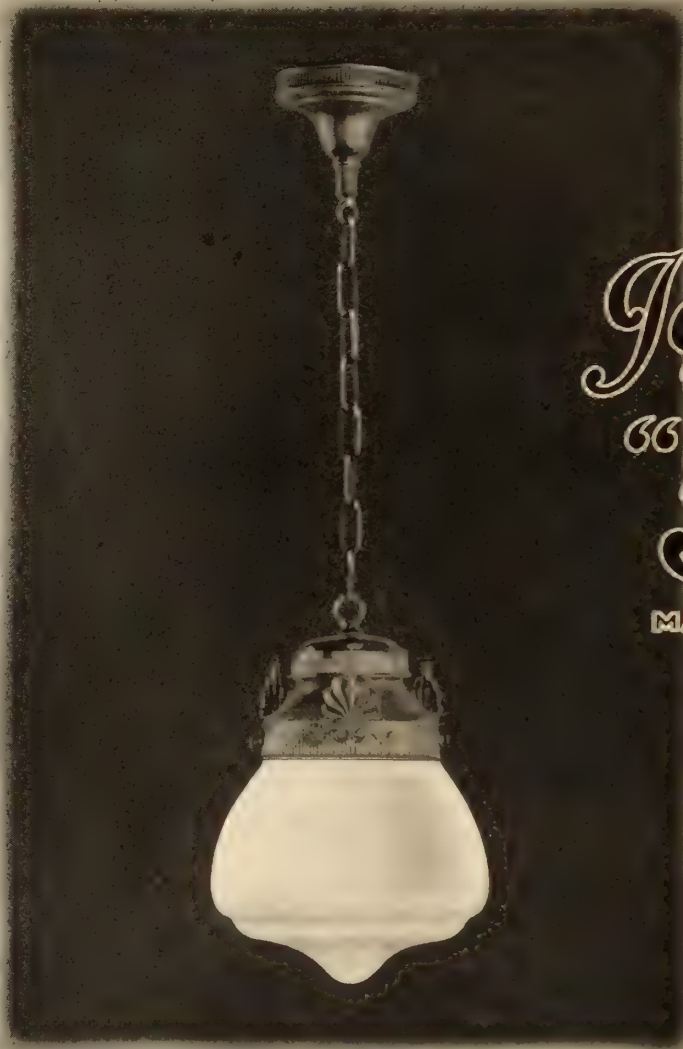
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Heat Insulations, High
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Products

JOHNS-MANVILLE ELECTRICAL MATERIALS





Jefferson
"515"

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A Pleasing Deviation From the Ball Globe

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo glass, with standard 6" fitter. Adaptable for any business lighting.

GET ON THE "515" AND CREATE NEW BUSINESS

*Ask for Our New Booklet of Commercial
Lighting Units*

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272 Main St., Winnipeg

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Just a Catalogue!

Yes, Just a Catalogue—



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Switch Plates
Receptacle Plates
Conduit Boxes
Switch Boxes
Solderless Connectors

but something newer, finer, better in catalogues.

When the Banfield 1921 Catalogue was first contemplated, the only stipulation of our executives was that we supply our dealers with one that they might be proud to produce before a customer.

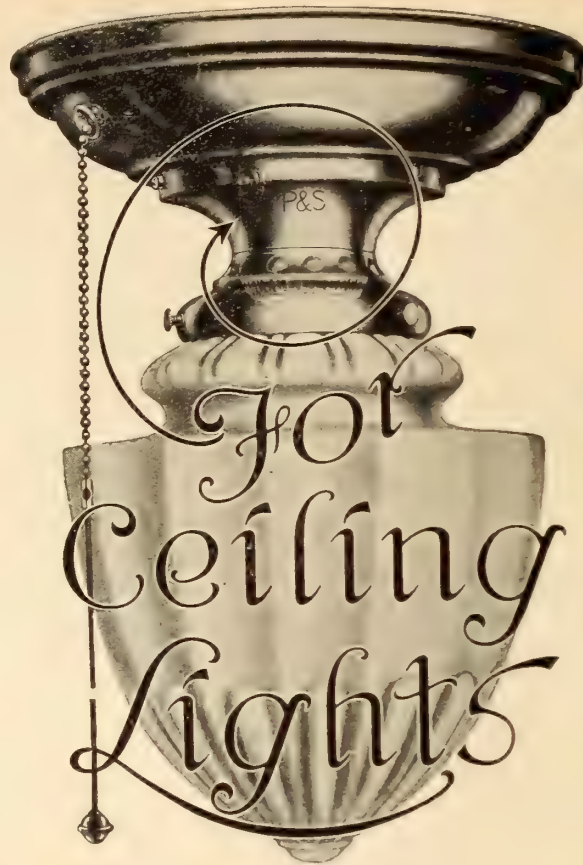
With this in mind we went ahead and with the help of inspired artists and designers, and men skilled in printing and its kindred trades, we have produced a catalogue that for beauty of design, color, harmony, completeness and practicability is far, far ahead of anything ever before attempted by a manufacturer of moderately priced fixtures and portable lamps.

W. H. Banfield & Sons Limited

370-386 Pape Avenue

TORONTO

*The Arrow
Points at the
Receptacle*



*Send for a
Sample of
P&S 998
Now*

Let us send you a free Sample
because these Receptacles are selling at this time

Fixture Men and Electrical Contractors
are Buying P&S 998 and 427

Easy to buy
Quick to use
For Quick Sales

Make a Snappy Bed-room Light
with 998 or 427



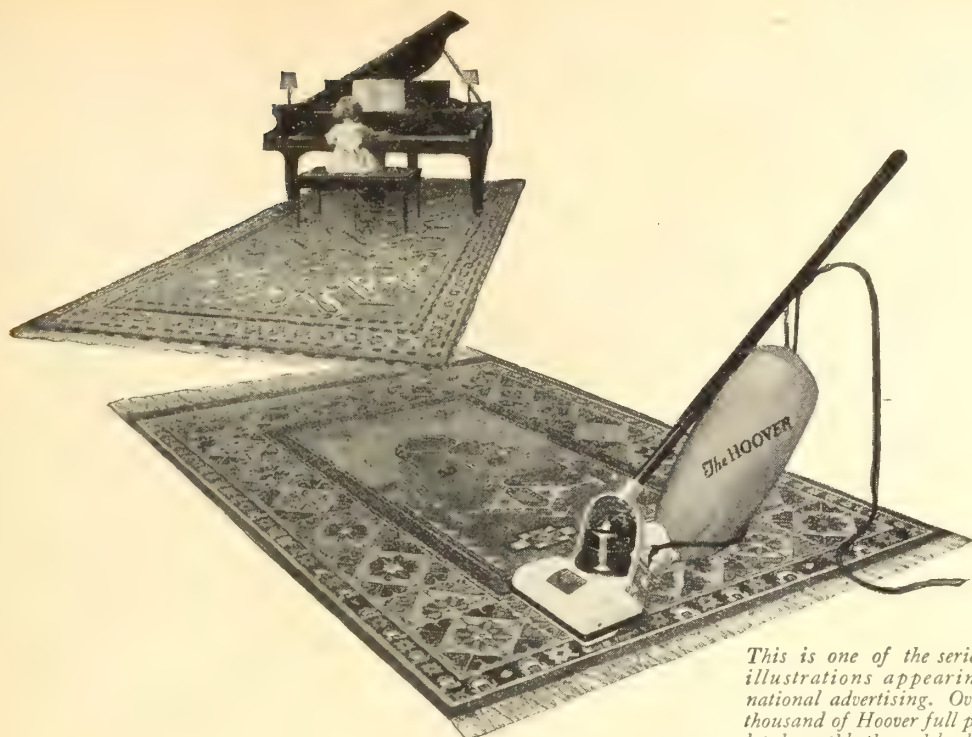
P&S 998



P&S 427

*Only a few folders left—
Write today for Ceiling Light Folder*

PASS & SEYMOUR, Inc.
SOLVAY NEW YORK



This is one of the series of striking illustrations appearing in Hoover national advertising. Over six hundred thousand of Hoover full pages are circulated monthly through leading magazines.

The Largest-Selling Electric Cleaner in the World

Throughout the world more Hoovers are in use, more Hoovers are sold daily, than is so of any other electric cleaner.

The thirteenth year of Hoover success, in a highly competitive field, finds this efficient cleaner steadily increasing the gap between it and its followers.

This can only mean that the reputation which The Hoover has so long enjoyed as the best electric cleaner, is becoming known to an even greater degree.

As a dealer you will find it easier and more profitable to sell such an appliance, rather

than to attempt to breast the current of demand with some less popular make.

And the result of selling The Hoover is a clientele of satisfied users, who commend their choice to others.

You can sell more Hoovers with less effort than you can sell any other electric cleaner, and you will make more friends for your store by so doing.

Would it not be wisdom on your part to join the ranks of the many dealers who concentrate upon The Hoover—the largest and easiest selling electric cleaner in the world?

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED

Factory and General Offices: Hamilton, Ontario

The HOOVER

It Beats... as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

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Rubber Covered Wires and Cables

FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

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**A Galvaduct Building
Bank of Nova Scotia at Hamilton, Ontario**

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you
—write us.

CONDUITS COMPANY LIMITED

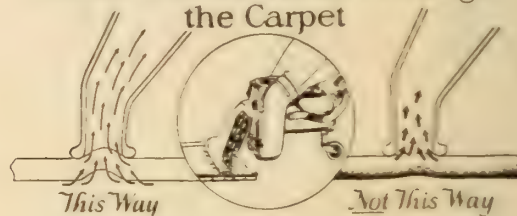
TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

EUREKA

Draws the Air Clear Through
the Carpet



Eureka's cleaning is rapid and thorough because it draws through the fabric more air moving at greater velocity. Instantly this unmatched suction dislodges imbedded dirt. It cleans faultlessly by greater volume and velocity of air.



A Money-Making Combination

Already 380,000 Eureka's have been bought by women who appreciate the superiority of Eureka's method of cleaning by air alone. Eureka has a larger sale than any other air cleaner made. It has radical superiorities of design and operative convenience—and its selling price is unusually low because of its simplicity and because our factory produces 1,000 cleaners a day.

The demand for Eureka's is increasing. Some desirable territory is still unassigned and we plan to expand our dealer organization. We want to hear from progressive dealers—electrical dealer-contractors, hardware, furniture, and department stores, etc.—who can utilize sales and advertising co-operation to the utmost in selling a cleaner of proved popularity at a truly popular price.

We want capable dealers because a good cleaner and a good dealer, backed by really helpful factory sales co-operation, is a money-making combination. One of our representatives is in your territory. Write or wire and he will call.

EUREKA VACUUM CLEANER COMPANY, KITCHENER, ONT.

Winner of Grand Prize at the Panama Pacific Exposition, San Francisco, Grand Prize and Gold Medal at Brussels, Belgium, February, 1920, and Grand Prize and Gold Medal at Milan, Italy, July, 1920.

Packard
TRANSFORMERS

LOOK! Something New!!

Heat Dissipators

ON OUR

Welded Steel Cases

ADVANTAGES—Smaller Transformer, Less Weight,
Lower Temperature Rise, Greater Overload Capacity



Others may follow, but we lead.

The Packard Electric Co., Limited
St. Catharines, Ontario

401 Temple Building, Toronto

421 Power Building, Montreal

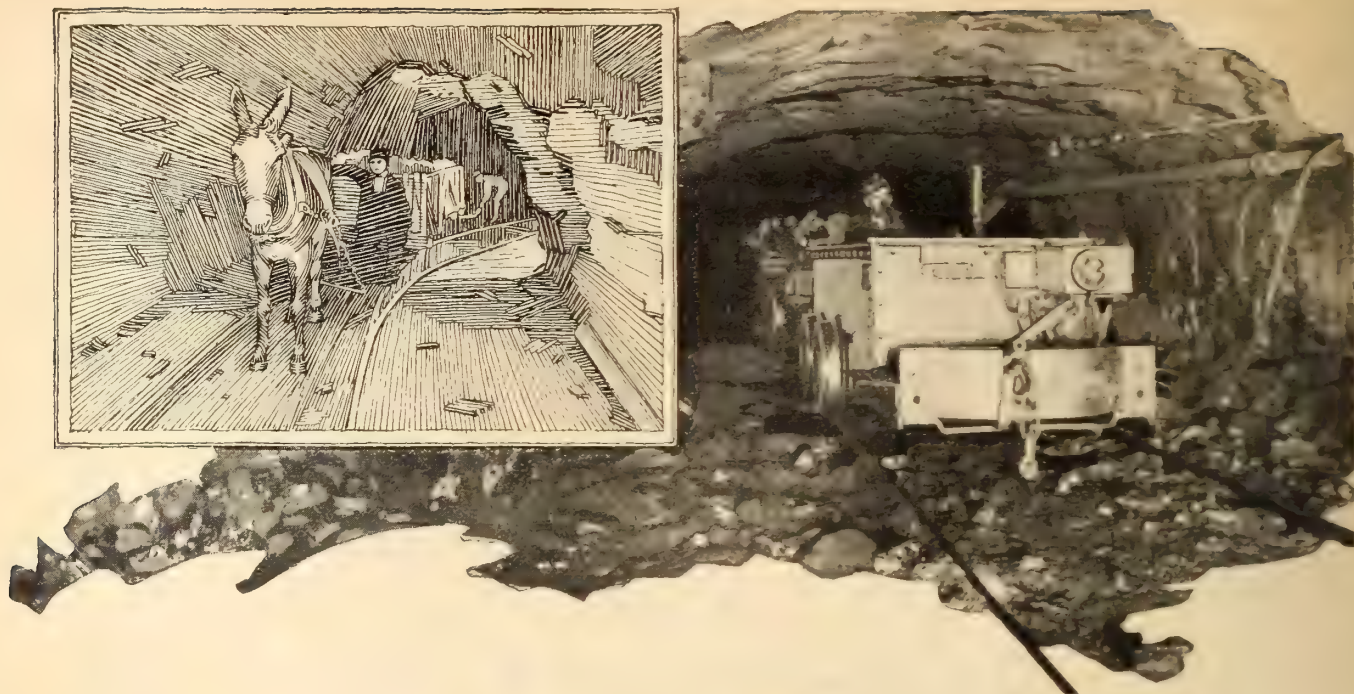
Confederation Life Building, Winnipeg

Agents:

Eastern Electric Co., Limited, St. John, N.B.

J. T. Warren, 738-11th St. West, Calgary, Alta.

W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.



In the Heart of the Mines

Hundreds of feet below the surface—where for years the picturesque mine mule has plodded his slow and inefficient way—powerful little mine locomotives, propelled by Exide Ironclad Batteries, are effecting savings in time and manpower that are astonishing.

Exide
MADE IN CANADA
BATTERIES

Thus it is in every line of industry—wherever storage battery power can be used—Exide Batteries are releasing men for more productive labor and at the same time producing increased results.

No matter what application of storage battery power you are interested in, there is an Exide for the purpose. Write us, we'll be glad to send you bulletins or other literature that explain clearly why Exides dominate the field of storage battery usefulness.

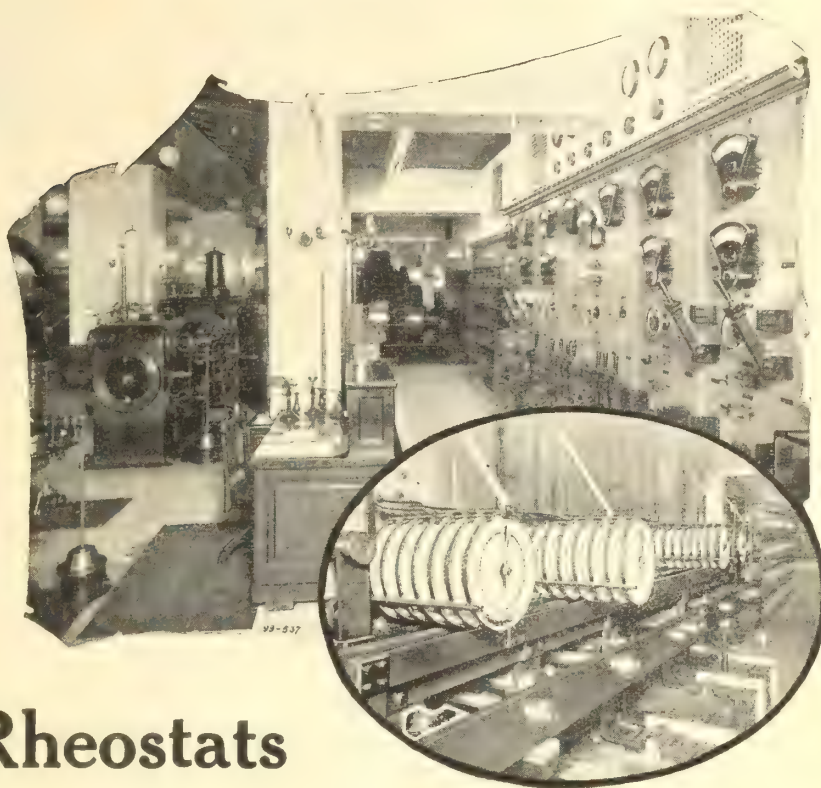
EXIDE BATTERIES OF CANADA, Limited
153 Dufferin Street, Toronto

Exide Batteries are made in Canada, in England, and in the United States. Into the Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

A 17-Year Old Vitrohm Set



Here in the power plant of the Metropolitan Building, New York, is a striking example of the real sturdiness of



Vitrohm Field Rheostats

Note how these units are virtually duplicates of our present-day product.

Look back at your motor, or transformer built 17 years ago—compare their 1903 crudeness with the present-day refinements—then consider the originality, the correct engineering knowledge that enabled H. Ward Leonard (the founder of our Company) to design and build Vitrohm units 25 years ago.

This Metropolitan job of four generators equipped with Vitrohm Rheostats has been operating satisfactorily daily for each and every day of the seventeen years. It is this kind of service that has caused the growth of Ward Leonard to its present size.

Ward Leonard Vitrohm Field Rheostats are made the same today as in 1903. Solid grids, with Vitrohm, vitreous enamelled insulation affording electrical and mechanical protection to the resistance element against corrosion or oxidation which would destroy ordinary resistance wire when heated and cooled in service.

If you have resistance problems in connection with plant operation or manufacture of electrical apparatus our experts will gladly assist in their solution.

We will gladly send you a free sample Resistor Unit so you can see and test for yourself the properties of Vitrohm.

Ward Leonard Electric Company

LOCATED 150 FEET NORTH OF NEW YORK CITY, IN

MOUNT VERNON

NEW YORK

"The Connor Sells



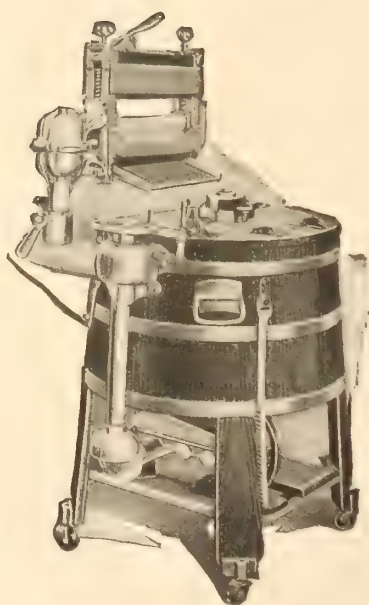
The CONNOR Kiddies

TRADE MARK REGISTERED

at a Fair Price"

The Warmer Weather Means Greater Sales for the "Connor"

"BLUE MONDAY" is never as blue as during the warm weather. That is why the housewife will be more receptive to the purchase of a washer at this time. She appreciates the freedom from wash day more than ever during the hot, sultry days of summer—and the CONNOR dealer can expect to see his sales jump.



Why don't you make the warm weather the time for introducing the CONNOR to your trade? This is a proposition that will yield you attractive profits, selling a product of unquestionable merit. Our guarantee protects both dealer and customer.

Let us send you full details concerning the CONNOR Perfection Washer—selling at a price within the means of the average housewife.

J. H. CONNOR & SON, LTD.
OTTAWA . . . ONTARIO

We carry stock for prompt shipments at Ottawa, London, Ont., and Winnipeg, Man.

For British Columbia, address Macpherson Teetzel Co., Vancouver, B.C.

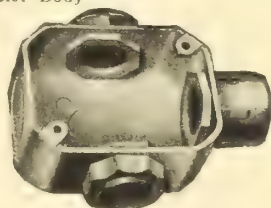
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body

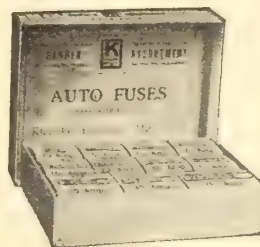


Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

FERRANTI METERS

Ferranti Meters are made to give a permanent service in constant accuracy.

Their actual record in the electrical field proves that they unfailingly serve the purpose for which they were made. They are specified where only the utmost in efficient accuracy is tolerated.



WATT METER

Ferranti Meter & Transformer Mfg. Co. Ltd.

26 Noble St.
TORONTO

128 Bleury St.
MONTREAL

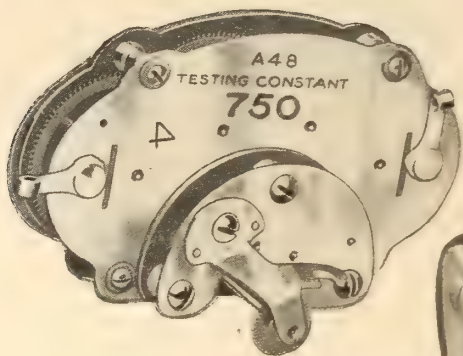
Simpson Bldg
HALIFAX.

145 Market Ave.
WINNIPEG

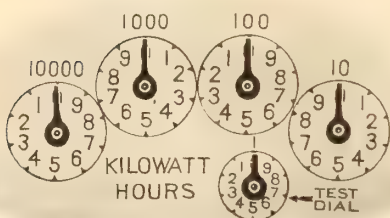
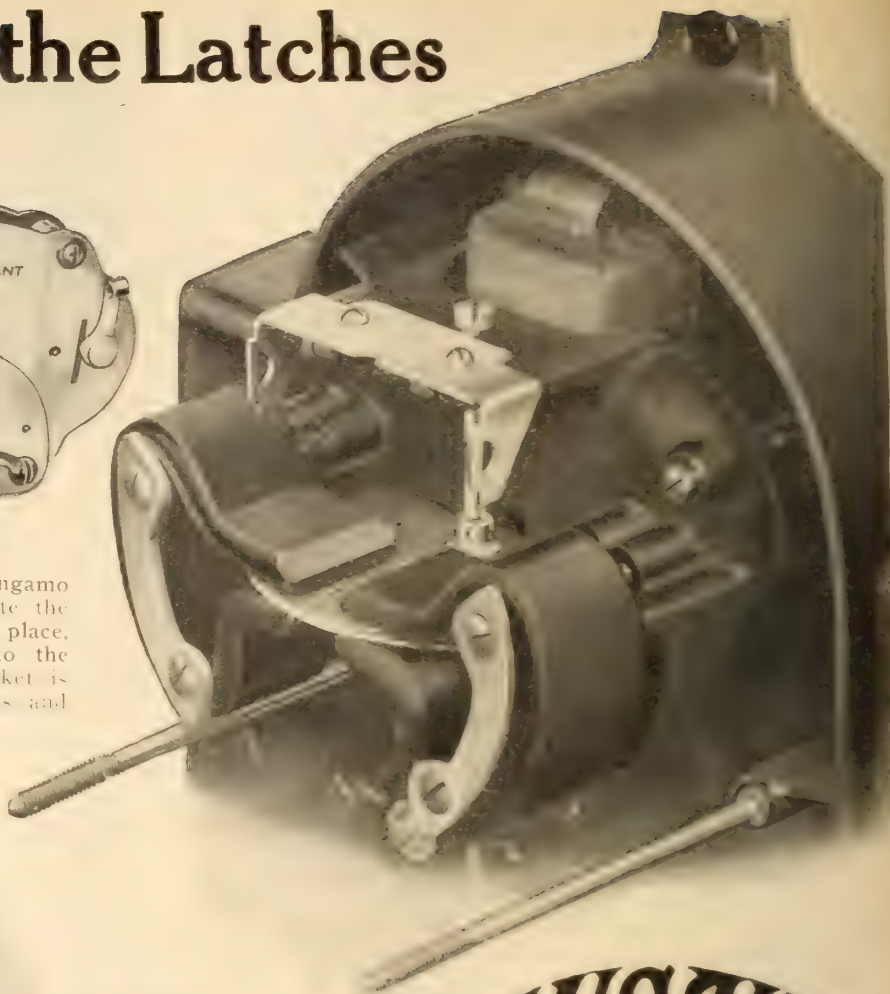
Northwestern Engin-
eering & Supply Co.
CALGARY

Northern Ontario
J. P. Bartleman
Timmins

Just Snap on the Latches



Back view of Recording Train of Sangamo Type "H" A.C. Watthour Meter. Note the two little ***latches*** which snap into place, thereby holding the train and dial to the supporting bracket (right). This bracket is held to the Main Grid by two screws and need not be removed.



Dial of Type "H"
A.C. Watthour Meter



The New Method of Attaching
the Recording Train of

Sangamo Type "H" Meters

This refinement in Sangamo Meter design means that instead of having to unfasten two screws in order to remove the Recording Train for inspection, it is necessary only to ***snap two latches***. The entire train comes away from the Supporting Bracket, leaving the bracket itself firmly screwed to

the Main Grid. To refasten the Train to the Bracket, simply snap the latches back again. Simplicity itself—typical of Sangamo Type "H" Construction throughout.

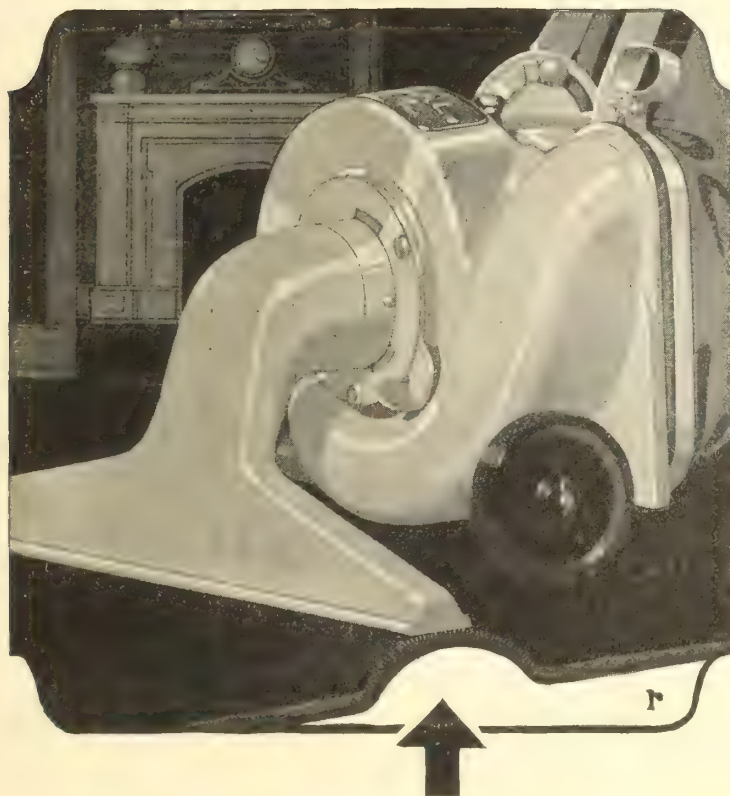
Send for Bulletin 55-C describing in full these A.C. Watthour Meters.

Sangamo Electric Company
of Canada, Limited

Factory: TORONTO

Head Sales Office: MONTREAL

ROYAL CLEANER SALES TRUTHS



CLEANS BY AIR—ALONE

147 cubic feet of air traveling at a speed of 9750 feet per minute, suck all the surface litter and all the embedded dirt, out of the rug or carpet and into the Royal dust bag. For mud which has dried upon the carpet, or for lint which has become entangled in the nap, a soft brush is provided; it is used only on rare occasions, so there is no continuous friction or grinding.

Air-alone cleaning with the Royal is thorough yet gentle. The Royal has none of the faults either of the motorized carpet sweepers or of the early vacuum pump machines. It is the true type of electric suction cleaner, developed past the point of relying upon mechanical friction to perform its thorough cleaning service.

Women who still inquire for motorized carpet sweepers should be taught that such machines, excellent enough in their day, have been superseded by the more modern, efficient and thorough air-alone type, of which Royal is the finest example.

Great West Electric Company Limited
Winnipeg

ROYAL
ELECTRIC CLEANER



You Can Make 40% Profit

THE secret of successful merchandising is quick turn-over. To keep our factory working up to top notch, and to boost "Made in Canada" electrical goods, we are inaugurating a merchandising campaign, featuring our celebrated Sovereign Electric Iron.

It's going to be a winner. Thousands of women will be attracted to the electrical stores, who are displaying the

Sovereign Electric Iron

in their windows.

The margin of profit on the Sovereign Iron is particularly generous. The new list price of \$6.00, and the special discounts, enable you to make 40% profit on this appliance.

Specially prepared advertising matter, suitable for your use, with your name and address printed, free of charge, is available. Sales letters printed on attractive dealer letterheads, ready-prepared newspaper advertisements, window cards, folders, etc., are yours for the asking.

Boost "Made in Canada" electrical goods

Canadian General Electric Co., Limited

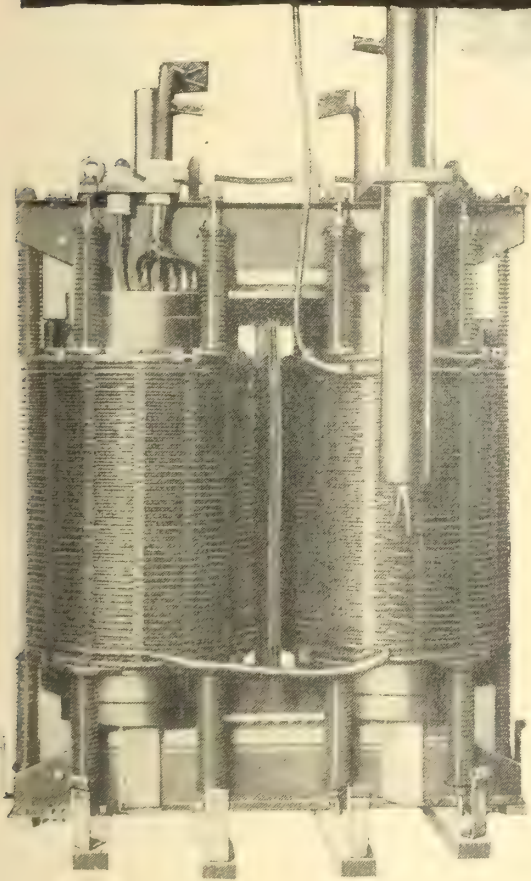
Head Office



TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson, and Victoria.

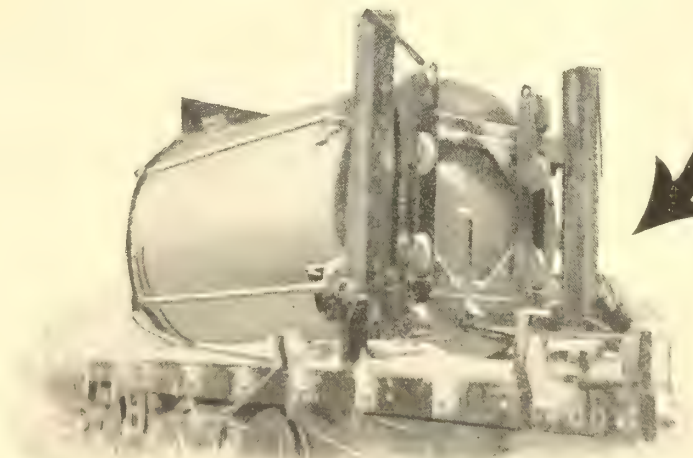
Transformer Service Depends on Insulation and Mechanical Stability



Core Type Transformer Withstood 240,000 Volts Insulation Test After Upset

A 4,000 K.V.A. 100,000 volt Transformer in transit to the Hydro Electric Power Commission at Port Arthur was thrown on its side, as shown in the photograph. Upon examination, it was found that the cover was cracked, the cooling coils dented, and a small fibre bolt had broken in the wooden support of the high tension lead guide bushings. The Transformer itself was, however, undamaged, and successfully withstood an insulation test of 240,000 volts.

We feel a certain amount of pardonable pride in this demonstration of mechanical stability by Canadian made apparatus.



Canadian General Electric Co., Limited
Head Office - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson, and Victoria.

"TRICABLE"

"TRICABLE" is particularly adaptable to installing and connecting,

Electric Stoves, Heaters, Washing Machines, and other Household Appliances, especially where space is limited.

Its use assures you of a workmanlike, neat, and a highly efficient job.

All sizes of "TRICABLE" up to and including 3 No. 4 are carried in stock.

Specify "TRICABLE" to your jobber.

EXCLUSIVE SELLING AGENTS

CONDUITS COMPANY LIMITED

33 Labatt Avenue

-

Toronto

ITE

CIRCUIT BREAKERS

BETTER AND CHEAPER THAN FUSES
THE CUTTER CO. PHILADELPHIA.

It Can Be Done

QUALITY LOW PRICES
100% SERVICE

The Ideal Combination

If this appeals to you let us
quote on your electrical
requirements and

WE WILL PROVE IT.

Cassco General Supplies
REGISTERED

MONTREAL

Phone M. 302

315 Craig St. West



Do You Use FIBRE?

We wonder whether you fully grasp the possibilities of Hard Fibre in connection with your particular business?

Do you realize that Fibre can do the work of pretty well any other material just as effectively and at a smaller cost?

Here, for example, are a few cases where Diamond Fibre and Condensite Celeron (a waterproof Fibre) have proved pre-eminently superior.

Washers
Pulleys
Bushings
Frictions
Insulating Papers
Handles
Slot Wedges

Parts for starting, lighting
and ignition systems.

We have a book on Diamond Fibre which we would like you to look over.

Its properties, its adaptability to hundreds of different uses, its composition and the reasons why its use may be the means of increasing your production and decreasing your production costs are fully explained.

Send for a copy or ask our experts to give you their opinion and advice on any special production problem that is worrying you.

Diamond State Fibre Company
of Canada, Limited.

Head Office and Works
235 Carlaw Ave., Toronto, Canada
Montreal Branch
84 St. Francois Xavier St



We Built Six

We take some pride in the fact that a group of six single phase Transformers as supplied by us to the American Cyanamid Company represent the largest Transformers of this type ever built in Canada. See illustration.

These Transformers, like many others for special duties, were designed and built complete in our Plant here in St. Catharines.

At your service.



1000 K.V.A. 11,400 VOLTS. 100 H.P. 60 CYCLES PER SECOND. 25 TONS. 8' 2" DIA. 30' H. 1000 K.V.A. 11,400 VOLTS. 100 H.P. 60 CYCLES PER SECOND. 25 TONS. 8' 2" DIA. 30' H. 1000 K.V.A. 11,400 VOLTS. 100 H.P. 60 CYCLES PER SECOND. 25 TONS. 8' 2" DIA. 30' H.

Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

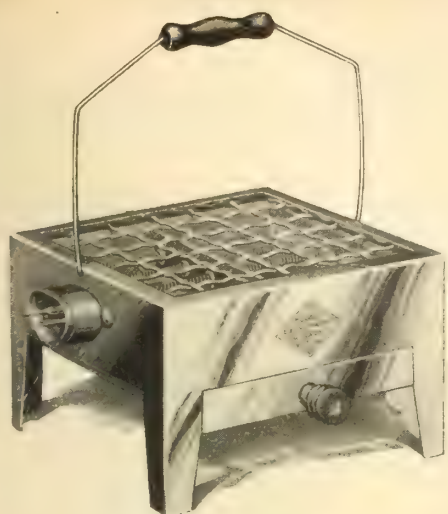
Northern Electric Company
LIMITED

**THE CANADIAN
CROCKER-WHEELER CO.
LIMITED**

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL



6½" Square, High Nickle finish

Supplied also with cord directly attached that will not burn off.

A Bale handle that is always cool.

An open element with toasting tray below will cook and toast at same time.

An article correct in design and workmanship built to "stand up"—a pleasing addition to any table.

Orders solicited now—Display these Stoves—
The demand is there. Liberal Discounts.

The Hubbell Electric Products Co.

132-134 SIMCOE STREET, TORONTO

Enquiries from Reputable Jobbers East and West Requested.

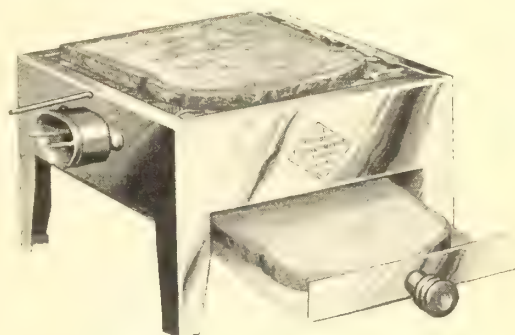
THE HUBBELL TWIN TOASTER-GRILL

ONE OF THE REAL SELLERS THIS YEAR

NEW FEATURES:

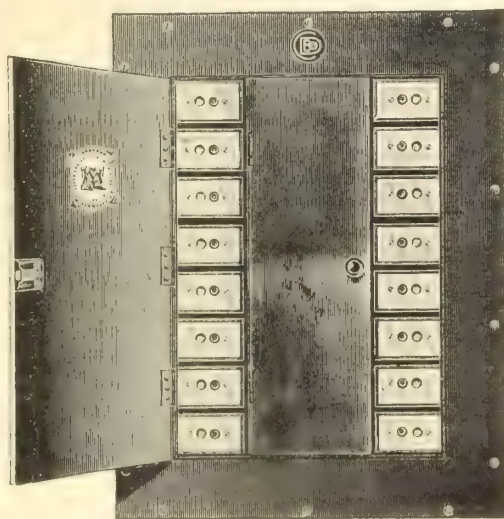
This appliance can be purchased without attachment cord and plug connections.

It is equipped with the **Hubbell Universal Terminal Contacts** designed to fit all plugs on attachment cords that accompany irons, toasters and other electrical appliances now on the market. Every household has one or more appliance cords.



115 Volts—6 Amps—H.E.P.C. App. No. 640

OUR NEW STANDARD PANEL WITH CABINET



10 Amperes per Circuit. 125 Volts.

This Dead Front Panel with Cabinet is designed to use the Standard Push Switch and 3-2 or 2-2 wire cutout, the inner door covering the cutouts and fuses. It is absolutely safe for anyone to operate. Just the Panel and Cabinet required where you have a number of Lighting Circuits to be controlled from one point as it meets all requirements and is suitable for any number of circuits. We also manufacture in Toronto a full line of Service Boxes, Motor Starters, Panel and Distribution Cabinets, and Type E Boxes.

ASK YOUR JOBBER FOR THEM.

CANADIAN DRILL & ELECTRIC BOX CO., LIMITED

1402 QUEEN ST., EAST, TORONTO, ONT.

Attractive Profits Selling This Machine

The average householder can effect a saving of between \$50.00 to \$100.00 a year by the use of

The CANADIAN IRONER

The profits you can make selling this machine are unusually attractive and we would like the opportunity of explaining our agency proposition to you.

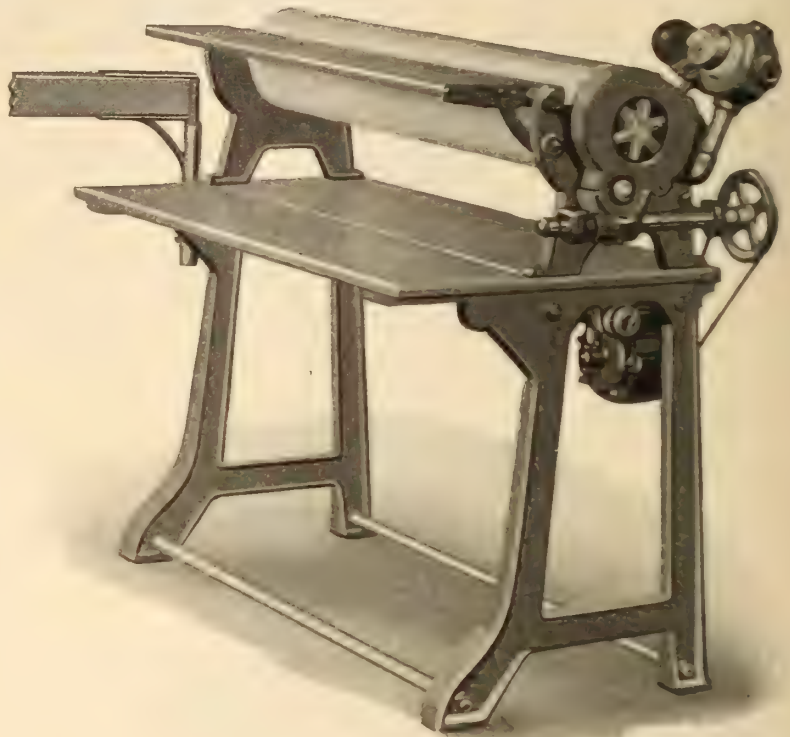
The "CANADIAN" is furnished in three sizes, 46 in., 42, and 37 actual ironing widths. Motors are supplied standard 110 volts and 220 volts direct current, and 60 cycles, 100 or 220 volts alternating current.

Manufactured in Canada by

Meyer Bros.

99-101 Queen Street E., Toronto
423 St. James Street, Montreal

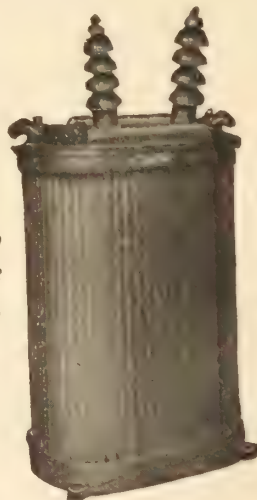
ESTABLISHED 1884



*Used
From*

*Universally
Approved*

Moloney
*A purely
Canadian made
Product.*



Transformers
*All inquiries
receive prompt
attention.*

*Coast
to
Coast*

*Reliable
and
Efficient*

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.
District Offices Factory Head Sales Office

Montreal and Halifax Windsor, Ont. 1221-2 Bank of Hamilton Bldg. Toronto

G. M. Gest, Limited

Contracting Conduit Engineers

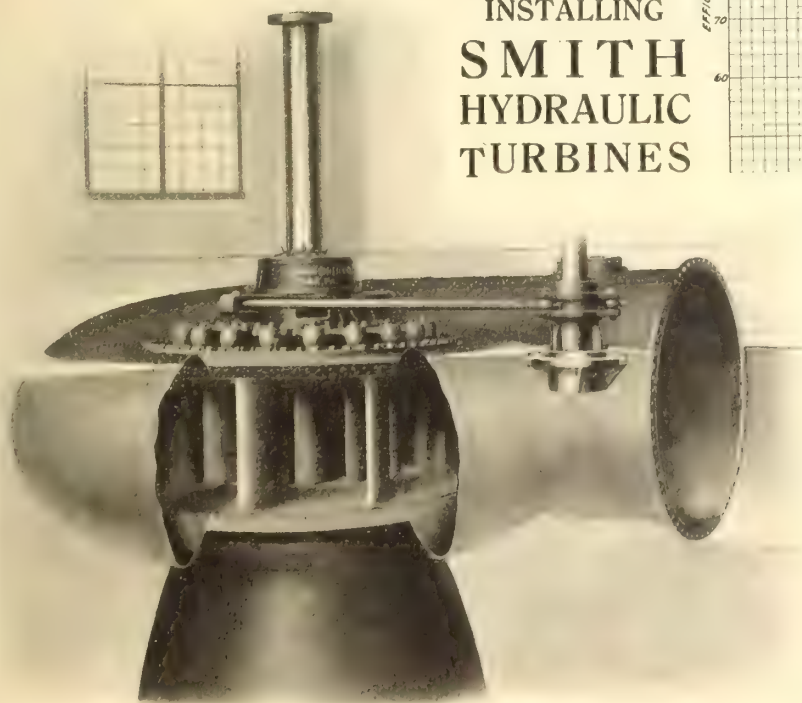
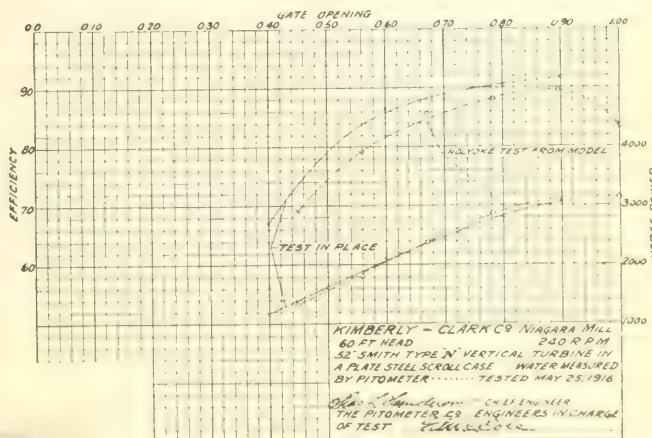
Head Office
Power Building
Montreal

Vancouver

Winnipeg

RESULTS

JUSTIFY
INSTALLING
SMITH
HYDRAULIC
TURBINES



The year 1921 has on its
program an immense amount
of

**WATER POWER
DEVELOPMENT.**

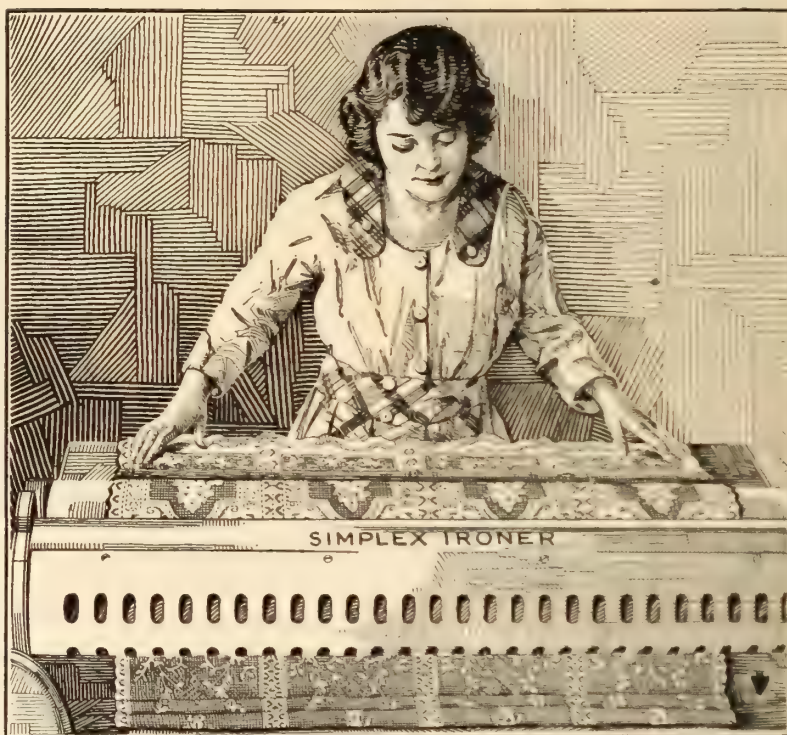
If interested, ask for Bulletin "N"

S. Morgan Smith Co.
York, Pa., U. S. A.

H. B. VAN EVERY, Representative
405 Power Building - MONTREAL

SIMPLEX IRONER

"THE BEST IRONER"



We are pleased to inform all dealers that we are now in a position to supply their wants in Simplex Ironers from our plant at Woodstock. We are ready to ship from stock 42 and 46 inch sizes in Electric, Gas or Gasoline heat and are in a position to render effective dealer helps and service. We solicit your inquiries for such assistance in helping to organize an effective Ironing Machine department.

Canadian Ironing Machine Co., Limited
Woodstock - Ontario



Durable Construction

THE drawn steel used in the frame and base of the R & M Fan is extra thick— $\frac{3}{32}$ of an inch—and the fans are stronger and more rigid than the heavy cast iron fans. The gears in the oscillating device are large and accurately fitted. The windings are heavily taped and thoroughly impregnated with a moisture-proof insulating compound. The blades are heavy sheet brass, mount-

ed on a steel carrier. The switch and speed coil are mounted on a heavy moulded insulation base which has great mechanical strength.

In every detail the R & M Fan is built as ruggedly as it can be made. The purchaser of a fan is vitally interested in its durability, and many sales are made easy for the dealer because of the rugged construction of the R & M Fan.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

Robbins & Myers Fans

Let's Be Reasonable

Does any reader of this page believe that **at this time** a re-adjustment of wages and hours in the printing industry involving an increase in labor costs of 36 per cent. is justified?

"Well," the reader asks, "What **are** present wages and hours?"

Toronto printers now have a minimum wage scale of \$35.20 per week for 48 hours. This is an increase of 10 per cent. over the scale called for in the agreement now expiring and was granted voluntarily by employers a year ago.

Their demands now are for a wage of \$44 per week for 44 hours.

This is an increase of \$8.80 per week for four hours less work.

It means an increase in labor costs of 36 per cent.

Toronto employing printers feel that they cannot grant these demands, and they believe that the general public will support them in their opposition to an increase of from 73c per hour to \$1.00 per hour to printers, pressmen, bookbinders, and mailers, **at the present time** and in view of business conditions **as they now exist**.

It is understood that International Union officials at Indianapolis have issued orders to local unions that the 44-hour week must be the basis of all new agreements.

In this order, employing printers believe that these Indianapolis officials are out of line with the need which is apparent in every industry for lower cost of production.

This is not a time for saddling any industry with an additional 36 per cent. labor cost, and publishers and job printers feel that they are justified—in the interest of the public—in resisting this unreasonable demand from Indianapolis.

The issue will be decided between now and June 1st. If the union demands of an increased wage of \$8.80 per week for 4 hours' less service are not withdrawn, a strike seems inevitable.

Pressure, therefore, must be brought to bear upon the officials at Indianapolis. They must be shown by members of the local union (many of whom feel that they are being forced to make unreasonable demands) that the Canadian public which buys the product of the printing craft, either in the form of advertising or subscription, does not look with favor upon any ruling which would add so heavily to the cost of that product.

Publishers and job printers in Toronto want to be fair. This is indicated by their action in voluntarily raising wages a year ago.

They must, however, in justice to themselves and the public they serve, resist these impossible demands.

Let's Be Reasonable

An expression of opinion of readers of this paper on the Unions' proposals involving an increase of 36% in the labor cost of printed matter, is asked. Will you not write a letter to the editor (not for publication) telling him your view of the situation.

This statement is published by and has received the endorsement of the Toronto publishers who are members of the

Canadian National Newspapers and Periodicals Association

including The Hugh C. MacLean Publications

Contract Record and Engineering Review, Electrical News, Footwear in Canada, Canada Lumberman, Canadian Woodworker and Furniture Manufacturer, Western Lumberman, Western Contractor and Builder, Western Coal Review, The Commercial.

Make The Housewife Your Friend For Life



**"Takes Out the
Drudgery With
The Dirt"**

SELL her a Miss Simplicity. That will do it because Miss Simplicity is such a wonderful help on wash-days. Indeed, in every sale you render a personal service that will be appreciated more and more with each succeeding week, and you place in the home a standing reminder of your store and of your service.

You can capitalize on the saving in health, strength, laundry and linen bills, effected by Miss Simplicity. Every sale increases goodwill. Every sale makes other sales easy. Miss Simplicity is indeed a business builder.

Miss Simplicity will satisfy your most exacting customer. It is thoroughly well-made; good workmanship; finest materials; mechanically perfect. Yet it is quite simple to operate, washes clothes clean, and what is especially important, sells at a strictly reasonable price.

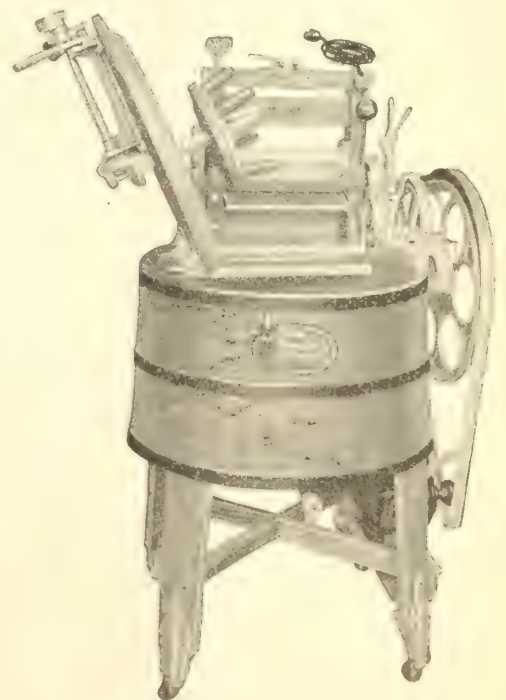
Write for our splendid dealer proposition. You will be pleased at the splendid profits and liberal guarantee we offer. Make your store headquarters for Miss Simplicity. Let Miss Simplicity increase your friends and your business.

We will supply you with attractive advertising material to help boost Miss Simplicity Sales. Full particulars will be sent with our offer.

W. A. KRIBS COMPANY LIMITED
Hespeler, Ont.

Western Distributors:
Great West Electric Company,
Limited
Winnipeg, Man.

Quebec Distributors:
Northern Electric Company,
Limited
Montreal, P.Q.



What We Are Doing For Dealers

DEALERS who handle our line of Electrical Appliances will reap the benefit of an especially forceful advertising campaign. The advertisements are now appearing in the best daily newspapers in the bigger cities from Montreal to Vancouver.

These newspapers include such widely distributed journals as the Montreal "Gazette," Toronto "Globe," Toronto "Mail & Empire," Toronto "Daily Star," Hamilton "Spectator," Brantford "Expositor," London "Free Press," Winnipeg "Free Press," Winnipeg "Tribune," Regina "Leader," Calgary "Herald," Saskatoon "Star," Edmonton "Journal," and Vancouver "Province."

Strong selling ads. will also appear in Toronto "Saturday Night."

The total circulation of these papers is 686,433.

Each paper will be read by approximately four people. Each advertisement, therefore, will tell its story to 2,745,732

prospective buyers of New Canadian Beauty Electrical Appliances!

Our new set of window cards are being shipped to our dealers. They were designed and painted by real artists. They are beautiful and effective.

We have also produced leaflets for consumer distribution which go into fine details about the various Canadian Beauty Appliances. These we supply to dealers in the quantity desired. Dealers are also most enthusiastic about these little sales helps.

Please remember that this is not just an empty promise. The campaign we have outlined will be carried out to the letter. We believe in giving our dealers every possible encouragement and support.

Write at once for our liberal plan, literature, prices, etc.

Renfrew Electric Products, Limited

Head Office and Works: Renfrew, Ont.

29 Richmond St. West, TORONTO, ONT.

803 Lindsay Bldg., WINNIPEG, MAN.

The New

Canadian Beauty Electrical Appliances





For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

HUGH C. MACLEAN PUBLICATIONS LIMITED

THOMAS S. YOUNG, Toronto, Managing Director
W. R. CARR, Ph.D., Toronto, Managing Editor

HEAD OFFICE - 347 Adelaide Street West, TORONTO
Telephone A. 2700



MONTREAL - - 119 Board of Trade Bldg.
WINNIPEG - - - Electric Ry. Chambers
VANCOUVER - - - - - Winch Building
NEW YORK - - - - - 296 Broadway
CHICAGO - - - Room 803, 63 E. Adams St.
LONDON, ENG. - - 16 Regent Street S. W.

ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for \$2.00 per annum. United States and foreign, \$2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean Publications Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, June 1, 1921

No. 10

Government Abolishing Commission of Conservation

It will come as a surprise to many of our readers to learn that the Dominion Government is introducing an Act to dispense with the Commission of Conservation. This matter has been the subject of a somewhat protracted discussion in the Senate, where the Bill has now been passed following its third reading. As it is a government measure it looks, should the government follow its present intention, as if the fate of the Commission is sealed.

Copies of the discussion have just come to hand as we go to press and it would seem as if many of the arguments, both for and against the Act, are well taken. It is very evident, however, that there was no unanimity of opinion as regards the abolition of the Commission, whereas there was practical unanimity that the Commission had performed a very splendid service. Under the circumstances it would appear to be the part of wisdom were the government not to act hastily, as we are not sure that a general expression of opinion on the part of the public would favor the abolition of the Commission.

Whatever the reason may be, the work of the Commission of Conservation has been looked upon with a great deal of confidence. As pointed out by one of the Senators, we are apt to regard the publications of any government department as being more or less tinged politically, whereas the reports of the Commission carried on their surface the guarantee of impartiality. Perhaps it was for this very reason that Senator Loughheed gave as the prime necessity for the

abolition of the Commission, the fact that it is not responsible to any government department. Be that as it may, and speaking as one who is more or less closely in touch with a variety of people who from time to time are looking for statistical information regarding our natural resources, the writer is free to state that he has found the publications of the Commission to be very widely used, very much more widely known than the reports of government departments, and very highly spoken of.

As an example, may be cited the general manager of one of the largest electrical companies in the province of Quebec who within the last fortnight pointed to his copy of "Electric Generation and Distribution in Canada," compiled by Leo G. Denis, and stated "that is the most valuable book in my library."

In explaining the government's determination to do away with the Commission of Conservation, Senator Loughheed appears to have somewhat overstepped the facts, in one or two cases, and to have made statements that were easily refuted by other members of the Senate in the subsequent discussion. This is regrettable and makes it all the more necessary that the matter should not be rushed unduly. If it is a fact, however, that there is a very considerable duplication of effort—"deliberate" duplication, as Senator Loughheed says—surely the government can direct the activities of the Commission along different channels. This would, perhaps, be better than abolishing an organization which is admittedly very useful, and would naturally appeal to the electors as a more reasonable course.

Possibly, the main claim for the existence of the Commission is that it is an impartial body and that it has carried out its work impartially. A contemporary has referred to it as the "Watchdog of Canadian National Resources," and the name seems well chosen. We would urge that undue haste be avoided in dealing with this matter. On other pages of this issue extracts from various addresses in the Senate are given with a view to informing our readers on the general situation.

Electric Club of Toronto Closes Successful Year

The Electric Club of Toronto brought a most successful year's operations to a close with their annual meeting on May 13. Honorary Treasurer Mr. Jos. Showalter reported that he had been able to increase the credit balance by a considerable amount, so that it now stands at \$339.21. The honorary secretary, Mr. S. L. B. Lines, reported an average attendance during the year of 95.

The speaker of the day, Mr. Frank T. Groome, explained to the members of the club the activities of the recent Cleveland campaign in which he had taken part, and which was described at length in the Electrical News of April 15, 1921, on pages 45, 46, 47. The members of the club were very much delighted to hear about this campaign at first hand and many of them have expressed a keen desire to do something along the same line in Toronto. The constitution of The Electric Club of Toronto prevents it from taking part in any commercial undertaking, and it would appear as if some similar group would have to be organized for the express purpose of carrying on this campaign if it is decided to be in the interests of the industry in Toronto.

The officers of the club for the following year are as follows: President, Frank Kennedy, manager Toronto office Bell Telephone Company; vice-president, E. M. Ashworth, acting general manager Toronto Hydro-electric System; hon. treasurer, J. F. S. Madden, Ontario Hydro; hon. secretary, S. L. B. Lines, president and general manager Chamberlain & Hookham Meter Co. of Canada. Executive: R. G. Black, consulting engineer; A. S. Edgar, Canadian General Electric;

R. A. L. Gray, R. A. L. Gray & Co.; M. B. Hastings, A. H. Winter-Joyner, Ltd.; C. H. Hopper, Canadian Westinghouse; T. C. James, Ontario Hydro Commission; W. D. Neil, C.P.R. Telegraph Co.; F. T. Ritchie, Northern Electric Company and Geo. D. Perry, ex-officio.

The retiring president, Mr. Geo. D. Perry, general manager Canadian National Telegraphs, spoke briefly, expressing his appreciation for the assistance of the executive and the co-operation of the members during the past year.

Montreal Electrical Co-operative Luncheon Lives Up to Its Name

The 1920-21 season of the Montreal Electrical Co-operative Luncheon was the best attended of any season since the luncheons were started in 1916. At the closing luncheon on May 18, Mr. T. H. Chennell, the secretary-treasurer, reported that the average attendance had increased every year, that of 1920-21 being 98. The name of the luncheon had been changed from "The Montreal Weekly Electrical Luncheon" to its present name, on affiliation with the Electrical Co-operative Association of the Province of Quebec. This name, added the annual report, implied more than would appear on the surface, as the luncheon had co-operated in many worthy cases, both from a charitable point of view and in connection with matters affecting the electrical industry.

Mr. Chennell referred to the various talks during the 32 meetings held, pointing out their varied and educational character. The committees and officers had worked splendidly, and the success of the season had been due to their united efforts.

Mr. W. H. Winter, the president, expressed pleasure at the progress made by the luncheon, which had justified itself in every way. He also referred to the excellent work done by Mr. Chennell. Votes of thanks were passed to the president and others.

A musical programme was provided by Messrs. Bert Mason, L. McMahon, E. G. Lee, C. Johnstone, W. R. Taylor, and K. Milne. Besides this, the members united in singing some popular choruses.

A collection for prizes for the boys of The Boys' Farm at Shawbridge totalled \$97. The members of the luncheon will visit the home on June 4, a very complete programme having been arranged for that occasion.

Manitoba Electrical Association on Sound Footing

On Thursday, the 12th of May, at their fortnightly luncheon held in Winnipeg, the Manitoba Electrical Association elected Morris E. Deering as its president and J. Swan as secretary-treasurer. Mr. Deering, who is a graduate in telephone engineering, of the Kentucky State University, came to Winnipeg from the Montreal office of his company in 1909 as telephone engineer, and was made local manager for Winnipeg a few months ago. Mr. Deering's election is a very popular one, as his genial personality has made him a host of friends. Mr. Swan is very well known in electrical circles, having been with the city of Winnipeg Hydro-Electric for some years in the capacity of manager of the appliance department.

The Association is anticipating a very active and successful year under the guidance of the newly elected officers. It is pleasing to note that the late executive, with Fred Pratt (purchasing agent of the Winnipeg Electric Railway) at its head, has done much to put the Manitoba Electrical Association on the sound footing that it enjoys today. The new executive is made up of the following:

Fred Pratt, Winnipeg Electric Railway; L. M. Cochrane, Cochrane & Stephenson; L. B. Dickson, McDonald & Willson Lighting Co.; J. H. Martin, Winnipeg River Power; J. Gordon Smith, Great West Electric Co. Ltd.; H. Farley, Garry Manufacturing Co.; W. Sibbald, Sibbald Electric Co.; J. E. Lowry, Commissioner Manitoba Government Telephones.

New Commissioner for Manitoba Government Telephones

Mr. J. E. Lowry has just been appointed Commissioner for Manitoba Government Telephones. Born in Ireland, Mr. Lowry received his education in Belfast's model public school, the Municipal Technical Institute of Belfast, and the Electrical Engineering Institute of London, England. At the age of 20, he made his debut into the telephone business as an apprentice in the service of the National Telephone Co. of Great Britain, rising through various stages to the position of Inspector of rural exchanges and switchboard manager. He severed his connections with the National



Mr. M. E. Deering, local manager, Northern Electric Company, president Manitoba Electrical Association.



Mr. J. Swan, manager Winnipeg Hydro Appliance Department, secretary-treasurer Manitoba Electrical Association.



Mr. J. E. Lowry, commissioner for Manitoba Gov't Telephones and member of executive of Manitoba Electrical Association.

Company in 1908 to cross the ocean and take charge of the electrical work of the Edmonton system. Under his direction the system has been placed on a sound financial basis so that instead of showing a deficit ranging from \$30,000 to \$40,000 as was the case in the years 1910 to 1915, there was a net surplus of \$9,000, \$29,000 and \$52,000 respectively at the close of the succeeding years. After the automatic equipment was installed he became superintendent of the equipment, and in 1915 was offered, and accepted, the position of department superintendent. In 1916 Mr. Lowry was appointed general superintendent, which position he held until this spring, when he resigned to accept the position of Commissioner for the Manitoba Government Telephones. Mr. Lowry has just been appointed a member of the executive of the Manitoba Electrical Association. He is a member of the American Institute of Electrical Engineers, and the Alberta Institute Electrical Engineers.

Nova Scotia Electrical Association Doing Fine Work

The regular monthly meeting of the Nova Scotia Electrical Association was held on May 18 at the Green Lantern. The president, Mr. W. Murdock, maritime manager Northern Electric Co., occupied the chair. In addition to lighter entertainment of a most enjoyable character, Mr. C. H. Wright, Eastern manager, Canadian General Electric Co., gave an address on "Induction Motors." Mr. Wright treated his subject, in the main, non-technically, illustrating his remarks by charts and models. Among the members who took part in the entertainment were Messrs. Geo. Green, M. Harmon, J. S. Schriener and Joe Mills.

A number of committees reported progress, among them the membership committee, of which Mr. Clifford Baker is chairman. He reported 93 fully paid up members, with 50 more in sight.

Meetings are held every month and take the nature of an informal supper, commencing at 6.45. It is hoped in the near future that Messrs. Goodwin & Chace will be present and address the association.

Thirty-Seventh Convention American Institute Electrical Engineers

The annual convention of the American Institute of Electrical Engineers will be held in Salt Lake City, Utah, June 21 to 24. This is the 37th annual convention, and, being held on the Pacific Coast, is known as the "37th Annual and Pacific Coast Convention." The programme includes the following discussions:

"Hydro-electric Developments at Niagara Falls," by J. L. Harper, Niagara Falls Power Co., Niagara Falls.

"Modern Developments in Water-wheels," by W. M. White, Allis-Chalmers Company.

"Long Distance Transmission of Electric Energy," by L. E. Imley, Superpower Survey, New York, N.Y.

"Voltage and Power Factor Control of 66,000-volt Transmission Lines Connecting Two Generating Stations," by Raymond Bailey, Philadelphia Electric Company.

Symposium on Long-Distance Transmission Systems. (a) "Voltage Regulation and Insulation for Large Power Long Distance Transmission Systems," by F. G. Baum, Consulting Hydro-electric Engineer, San Francisco, Cal.

(b) "Some Transmission Line Tests," by W. W. Lewis, General Electric Company, Schenectady, N.Y.

(c) "Notes on the Operation of Large Interconnected Systems," by L. L. Elden, Edison Electric Illuminating Co., Boston, Mass.

"Modern Production of Suspension Insulators," by E. H. Fritz, Pittsburgh High Voltage Insulator Co., and G. I. Gilcrest, Westinghouse Electric & Mfg. Co.

"Voltage and Current Harmonics Caused by Corona," by F. W. Peek, Jr., General Electric Co., Pittsfield, Mass.

"A Solution of the Porcelain Insulator Problem," by E. E. F. Creighton, General Electric Co., Schenectady, N.Y., and F. L. Hunt, Turners Falls Power & Electric Co.

"Transformers for Interconnecting High-Voltage Systems or for Feeding Synchronous Condensers from a Tertiary Winding," by J. F. Peters and M. E. Skinner, both of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Electric Strength of Air under Continuous Potentials and as Influenced by Temperature," by J. B. Whitehead and F. W. Lee, both of Johns Hopkins University, Baltimore, Md.

"Synchronous Motors for Ship Propulsion," by E. S. Henningsen, General Electric Company, Schenectady, N.Y.

"Heat Losses in Conductors in A-C Machines," by W. V. Lyon, Massachusetts Institute of Technology.

Canadian Electrical Association Convention

Our readers are asked to keep the date of the Canadian Electrical Association Convention in mind. This is the 31st annual convention of the association, which will be held in beautiful old Quebec City. The dates are Wednesday, Thursday and Friday, June 15, 16 and 17. Headquarters will be at the Chateau Frontenac. The complete programme is announced elsewhere in this issue.

Probable Strike of the Printing Trades

Readers of this publication should know the facts in connection with the strike of the allied printing trades which will take place in Toronto June 1st unless a settlement is reached within the next few days. The situation is almost without precedent, the Unions having demanded what is equivalent to an increase of more than 36 per cent.

A year ago (although the wages agreement at that time had over a year to run) the Toronto publishers and master printers voluntarily gave their employees a 10 per cent. advance in wages, making the minimum wage \$35.20 for a 48-hour week. This was given in recognition of the fact that living costs had advanced. Notwithstanding that the cost of living, according to statistics, has declined from 15 to 20 per cent. since March, 1920, the printers have now asked for a 44-hour week and a wage of \$44.00 (\$1.00 an hour).

The orders for a 44-hour week were issued from the International Headquarters of the Typographical Union at Indianapolis, U.S.A. It has been said that the local union representatives have no power even to negotiate on the question of hours. It is an international movement for less production per day, which, in the light of existing world-wide conditions, is economically wrong.

The demand for an increased hour-wage of 36 per cent. has brought forth condemnation from all quarters. It is impossible to advance one sound argument to justify the increase, and unless the better type of printing craftsmen are able to secure control of the situation, the employers will be morally compelled to face a strike June 1st.

May we say to our readers that we are counting on your support and co-operation? You do not know how soon you may have the same problem at your own door. It is the intention of the directors of the Hugh C. MacLean Publications to put forth every effort to publish as usual. How far we shall succeed remains to be seen. If there is any break in publication, or any interruption in the service, it will be because we are fighting what are believed to be unreasonable demands.

Reorganization of Society for Electrical Development

A certain reorganization has been going forward in the Society for Electrical Development. The latest announcement is that Mr. J. M. Wakemen, general manager, has resigned and that his place will be taken by Mr. W. L. Goodwin. A recent announcement of the Society points out that the plans of the Society for Electrical Development are not yet complete but may be outlined more or less roughly as follows:

(1) A school is to be established for bond salesmen, so that they can obtain the background of the electrical industry and be taught to sell electrical securities more eagerly and successfully.

(2) A thrift league is to be started within the electrical industry, not only to encourage saving but to direct the investment of these savings in electrical securities. A responsible finance committee will be organized to give advice.

(3) A legal department will be established to watch the activities of government and state legislation as it affects electrical men. This department will inform the industry as to the drift of legislation in all sections and advise it how to express approval or disapproval or how to adapt itself to the new laws.

(4) An expert statistician will be set to work to develop data and statistics from government, financial, press and other sources and prepare them for actual practical use by the different branches of the industry, interpreted and analyzed for the man who needs them in his business. These statistics will not be merely filed, but sent out for the good that they will do.

(5) The problems of installment selling will be studied and a handbook prepared for the assistance of dealers and central-station companies, backed by a service that will assist all members in the financing of installment contracts by placing them in touch with the market for such paper.

(6) A speakers' bureau will be established on a basis that will enlist a corps of speakers who will be available whenever an opportunity arises to present the message of the electrical industry to an audience of whatever sort. Thus our story will be more effectively told to Chambers of Commerce and all the other bodies throughout the country whose interest and appreciation can be made so valuable. Skeleton speeches will be prepared for the personal use of members for any kind of occasion for which an address may be needed.

(7) Regional committees for the guidance of public opinion will be formed among the business men of cities and towns—men who are not in the electrical industry themselves but who appreciate the civic value of electricity and its influence in every industry. These men can and will bring tremendous support if they are so organized.

(8) A correspondence school will be established to provide courses for a broad variety of subjects that will train men for different jobs in all branches of the industry.

(9) A contract will be built up with universities and colleges that will influence the electrical education offered to the young men of this country. The industry needs more than specially educated engineers. It needs trained business men as well, and the society can help toward this.

(10) Careful trade surveys will be made as they are needed for the service of any group in the electrical business, and trade data will be maintained available to members in times of emergency.

(1) A representative of the society will be stationed in Washington to keep in touch with the work of the different government departments, so that the electrical industry may

know in detail what is being developed there of value to it and how to utilize the information.

(1) Good-will publicity campaigns will be conducted as needed by the different branches of the industry, and the present service of co-operation with popular magazines and trade journals will be continued and expanded.

(13) The publication of a series of handbooks on various subjects that are not at present adequately supported by printed data is planned, as well as a sensible program of other selling helps, produced as required.

These are but a few of the ideas around which the reorganization of the Society for Electrical Development is revolving, but they indicate the breadth of the view that is being taken and promise an economic service to the entire industry that will be of actual practical assistance in the day's work to electrical men of every class. At the same time it has been decided to reduce the dues of the society in all classes in accordance with a new scale that in some cases will mean a cut of as much as 50 per cent and to increase its membership so that it shall be truly national in distribution and comprehensive in its character. The basis of reckoning the annual amount of dues will be accurately adjusted, and the finances of the society will unquestionably be greatly strengthened.

Annual Meeting Toronto Section A.I.E.E.

The annual business meeting of the Toronto Section of the American Institute of Electrical Engineers was held in the Lecture Room of the Engineers' Club, 96 King St. W., on Friday, May 13. The nominating committee, appointed in accordance with the bylaws, submitted a list of members for the various offices for the ensuing year. These were approved as follows: Chairman, Mr. W. P. Dobson, director Hydro-electric Laboratories; Secretary, Mr. P. A. Borden, Hydro-electric Laboratories; Executive Committee, Messrs. C. E. Schwenger, Toronto Hydro; L. B. Chubbuck, Canadian Westinghouse; George D. Leacock, sales manager Moloney Electric Company of Canada, Ltd.; O. V. Anderson, Toronto & Niagara Power Company; D. B. Fleming, Ontario Hydro-electric Power Commission; S. E. M. Henderson, Canadian General Electric Co. Following the business meeting there was a short, informal meeting at which Mr. Edgar T. J. Brandon, chief electrical engineer of the Hydro-electric Power Commission, gave an interesting illustrated talk on the Queenston-Chippewa power development. Mr. Brandon has intimate knowledge of the electrical design and construction of this system from beginning to end, and his descriptions were very much appreciated by the members. This talk was followed by a considerable discussion, indicating the intense interest of the engineers in this power development, which, as Mr. Brandon modestly pointed out, will make use of the largest generating units that have ever been constructed. Light refreshments brought to a close the activities of a most successful year's work.

Westinghouse Fans for 1921

A dull black finish for the blades and guards as well as the motor and base is the feature of the line of fans which the Westinghouse Electric and Manufacturing Company will place upon the market for 1921. Previously the blades and guards were highly polished brass, coated with a transparent lacquer. The change of the finish adds materially to the beauty and unobtrusiveness of the fans. The absence of a bright finish precludes reflections of light while the fan is oscillating. The six blade fans will be discontinued this year.

Exit Commission of Conservation?

Sir James Lougheed Bitterly Attacks and Other Senators Defend the Work of this Organization—Below are Given Extracts from the Senate Debate

Hon. Sir James Lougheed: It entered upon external affairs, making independent representations to and before International Joint Commissions, and by publicity propaganda which has at times confused the settled policy of the different departments in connection with international problems. It invaded the field of the Department of the Interior in regard to water-powers, stream flow, forestry, wild life, natural resources inventory and information. It then cast its eyes abroad and saw a field of usefulness in the Marine and Fisheries Department, and made representations on the depletion of the sockeye salmon in British Columbia at a time when the question had been dealt with by international negotiations. Not satisfied with operating on the surface of the earth, it went below it, and took up the question of mines, and dealt with coal, peat, pulverized fuel, gas, mineral fertilizers, and mineral resources survey. It entered the field upon which my honorable friend yesterday delivered a very interesting address, namely, scientific and industrial research, and proceeded to take up the fuel problem of Western Canada, the briquetting of lignites, the utilization of fish waste, and so on.

The cost of the Commission began to mount up from the small sum of about \$12,000, mentioned by the Minister of Agriculture at the time he introduced the Bill, until it has, since its inception down to the present time, averaged something like \$104,000 per annum. The staff of three or four clerks and a couple of typists increased, and there has been spent by the Commission upon salaries of staff over \$610,900. The travelling expenses of the Commission have reached \$115,600. The library of the Commission alone has cost \$24,000; and if you give a Commission \$24,000 worth of books, and give them a free hand to exploit all the information that may be found therein, you will very likely be involved in a further expenditure of a very considerable sum of money. In the printing of reports and the publication of publicity propaganda the Commission has expended over \$280,480. The expenditure for the last year—I think this is the fiscal year ending March, 1920, but I will not be positive of that—reaches the very handsome sum of \$155,771.31.

The growth of the Commission at this ratio of progress would very soon outstrip the expenditure the Government of Canada is making upon the different departmental activities which have always been carried on, and which cover the same class of work.

I do not refer to the activities of the Commission in any critical or hostile way. I simply point out what is the logical sequence of creating an organization and giving it authority when it cannot be controlled or restrained by any Minister of the Crown inasmuch as it is only responsible to Parliament. This Commission is not controlled by any Department. It makes use of the Minister of Agriculture as the channel through whom its desires and representations reach the Government. But in a sense it is a law unto itself. With all due regard to the work done by the Commission and to the ability of the staff, I must say that the position is subversive of a very well established principle of government. That is to say, the members of its staff are not responsible to any Minister, and therefore are not responsible to the Government. The Government cannot satisfactorily control any authority which is not responsible to a Minister. In fact, it is a fundamental principle of representative government that responsibility must vest in a Minister. The Minister is re-

sponsible to the Government, and the Government is responsible to Parliament. Consequently we have been forced to recognize that some step must be taken to prevent a duplication of the work which is being carried on by the various departments to which I have already referred. That duplication of work, as honorable gentlemen will readily understand, will become intensified as time goes on, because we have the departmental branches and the Conservation Commission endeavoring to out-rival each other in the same field of action. The more eager they are in the race, the greater the expenditure becomes until in due course it would overwhelm the exchequer of the country.

Then follows a resume of the work of the Commission of Conservation, followed by this statement:—

These, honorable gentlemen, are a few of the many illustrations that might be cited of deliberate overlapping—it has not been accidental, it has been deliberate—of the other activities of the government departments, thus involving the expenditure of a considerable amount of money.

An Impartial Body

Hon. Hewitt Bostock: My honorable friend, referring to the reports published by the Commission, has mentioned that there is in them a great deal of repetition, and that in one instance, I think, they are not brought up to date. But I have found in various parts of the country that those reports have been read very widely. There is sometimes a disposition on the part of the public to read the report of a Commission of this kind more readily than a departmental report. Without wishing to cast any reflections on any of the departments, I think there is on the part of the public a feeling that the report of a department may be biased in favor of the policy of the government; that it would not criticize in any way a policy laid down by the departmental head. It is quite possible that some friction might arise as between a commission of this kind and a department in this respect.

Then, again, this Commission should be in closer touch with the different provincial governments throughout the Dominion and there is possibly quite an advantage for the country in the fact that, in dealing with the question of our natural resources, the Commission can keep in touch with the various provinces of the Dominion in a better, more friendly, perhaps more unofficial way than can the officials of a department of the government. I think there has been a considerable amount of good work done by the Commission since its establishment, and that, if anything, from what my honorable friend has said here to-day, parliament itself has been somewhat remiss in not paying more attention to the work of the Commission and keeping down the expenditure or making the Commission show more particularly, each session, how the money was going to be spent, or pointing out to the Commission that they should be careful to see that their work did not overlap the work of the department.

Admire the Publications

Hon. J. W. Daniel: I just rose to say a good word for the Commission. The action which is now proposed is, I suppose, necessary. The reasons stated by the leader of the government for abolishing this Commission are very good reasons, and such as would lead us to adopt the proposed legislation. At the same time, I would like to say that so far as I know the publications of the Conservation Commission, I admire them very much, and I have found them very in-

teresting and educative. They are produced in an attractive form, and for some reason or other are more widely read than the departmental reports which they are said to overlap. Why that should be I cannot say.

The leader of the government referred to one publication in which the Commission went into the matter of public health. I read that report with a great deal of interest, and in it I found the very article to which the honorable gentleman referred—an article on venereal disease, which is nowadays a matter of very great interest. To my mind that publication contained one of the very best short treatises on venereal disease that I ever read, and I thought it was a very valuable production.

I have been told by librarians that they were more particularly desirous of getting the reports of the Conservation Commission than they were of getting those of any other public department. That shows that the reports are attractive to the people, and that they are read by them to a greater extent than are the ordinary departmental reports.

Aided Imperial Government

Hon. W. Proudfoot: May I be permitted to ask the honorable gentleman a question? It has been reported that the Commission gave valuable information to the Imperial authorities in reference to certain timber used for the construction of flying machines, and that a large amount of money was saved thereby. I would like to know if that report is correct and to learn the particulars.

Hon. Mr. Edwards: That is quite correct. I have all those items, but did not want to trouble the House with them. When in the course of the war the aeroplane situation became serious, an inquiry was made in the United States and in Canada for lumber suitable for the making of aeroplanes. It was a curious fact that in all Eastern Canada, where spruce predominates, as it does in the Eastern Townships and other parts of Quebec and in parts of Ontario, there was practically none of that material that could be supplied; but this Commission was enabled, because of its knowledge of conditions, to point at once to a district in British Columbia, the Queen Charlotte Islands, where that material could be obtained. In that respect alone a service was done to Canada and the Empire that was worth the cost of the Commission many times over. That is only one instance of the many things the Commission has done for Canada.

Have Books for Business Men

Hon. Frederic Nicholls: Honorable gentlemen, you are all familiar with the old saying, "It is useless to save at the spigot if one wastes at the bung-hole." It seems to me a most curious coincidence that we have on the Order Paper at the same time a Bill for the purpose of economizing by withdrawing the charter of a Commission and another Bill for the purpose of organizing a new commission at a great, a very much larger, expenditure of money. In these days of super-taxation we examine all proposals to see if economy is effected, and we approve of them if they are in the interest of true economy; but I cannot understand, though I may on obtaining further information from other members, in what way the Research Council on which we are asked to spend several hundred thousand dollars at once for the building and equipment of laboratories, can do more effective work than the Commission of Conservation has done in the past. It is charged that there has been a great deal of duplication in the work of the Conservation Commission and that of certain departments, but, so far as I have knowledge, the publications of the Conservation Commission are standard—they are in libraries throughout the world, and are consulted by government officials and others in every country. Business men like myself refer to them, because we find in those publications, ready to hand, the essence of the information that we want. I would not know where else to get such information.

I do not know the publications of the various departments, and it would be a work of considerable research for me to obtain otherwise the information which is readily available in the publications of the Conservation Commission.

Early in the year I was asked to write an article for the Annual Financial Review of the Montreal Gazette, and I was forced at that time to pay this deserved tribute to the Commission of Conservation. This part of the article is very short, and I read it only to show you the practical result that has been accomplished by their efforts in various departments. I said:

The Commission of Conservation has accomplished a great work in investigating and surveying our available water powers and compiling and publishing statistics concerning their development and distribution. This work of the commission has attracted much attention in other countries, which are now commencing to appreciate Canada's wealth of natural resources. As evidence, I may submit that one of the United States great financial corporations, the Bankers' Trust Company, has recently published and widely circulated a book entitled, "The Dominion of Canada," which it calls "The Land of Achievement," and gives us full measure of credit for what this country has accomplished. The chapter devoted to our water powers is a model of compilation and concludes with the following paragraph:

"The bearing of these great resources upon the future manufacturing power of the country is significant, especially when the fact is held in mind that the electric power companies are adopting a policy of maintaining industrial departments whose duty it is to locate industries in the territory served by such companies. The combination of cheap power, favorable living conditions for labor and good labor markets, is rapidly transforming Canada from a country which was a few years ago almost wholly agricultural to one in which the manufacturing interests are of great and growing importance."

That article published by the Bankers' Trust Company is just a prelude. Now let me tell you what Mr. G. H. Ashley, State Geologist of Pennsylvania, says. He claims: that the industrial East has maintained its supremacy because of cheap fuel and nearness to markets. As cheap coal or wood fuel can no longer be obtained, industrial supremacy must be diverted to where cheap electric power is available, and as Canada, particularly Eastern Canada, has this great advantage, one need not be considered unduly optimistic when he cherishes the belief that in the near future the present movement of great United States industries to locate branch establishments in Canada will be greatly accelerated.

Another eminent scientist, Sir Charles A. Parsons, inventor of the steam turbine, also bears witness to the same effect. At the last meeting of the British Association for the Advancement of Science, he stated: "At some time more or less remote—long before the exhaustion of our coal—the population will gradually migrate to those countries where the natural sources of energy are most abundant."

There is a great deal more to the same effect, but I will not weary the House with that. The point I want to make is that the publications of the Conservation Commission are looked upon as standards when they are dealing with the natural resources of the country. They have created favorable comment, and to my own knowledge have brought many millions of invested capital to this country because the people having money to invest, after consulting those documents, have felt that there were certain resources here which they could use to their advantage.

Why should this Act be brought forward to abolish the Commission? The Commission is the creature of the Government. They can let it spend \$50,000 a year or \$500,000 a year; they have absolute control over it.

Canadian Electrical Association

Thirty-First Convention (Quebec) June 15, 16, 17—A Most Attractive Program

WEDNESDAY MORNING—15th June

- 9.00 a.m. to 10.00 a.m. Registration (Chateau Frontenac).
10.00 a.m. General Session
President A. Monro Grier in the Chair.
Official Opening by Sir Charles Fitzpatrick, Lieutenant-Governor of the province, and Mayor J. Samson.

REPORTS AND PAPERS

1. Report of the Secretary-Treasurer for year 1920-1921.
 2. Report from Technical Section.
Chairman: R. J. Beaumont
Shawinigan Water & Power Co.
Discussion
 3. Report from Meter Committee.
Chairman: E. Holder
Shawinigan Water & Power Co.
Discussion
 4. "Electrical Standards and Their Application to Trade and Commerce."
By O. Higman
Director Electrical Standards Laboratory, Ottawa.
Discussion
 5. Report from Electrical Apparatus Committee.
Chairman: W. J. S. Wurtele
Southern Canada Power Co.
Discussion
- 1.00 p.m. Adjournment for Luncheon.

WEDNESDAY AFTERNOON—2.15 p.m. (Chateau)

6. Report from Overhead Systems Committee.
Chairman: O. V. Anderson
Toronto Power Co.
Discussion
 7. Report from Commercial Section.
Chairman: M. C. Gilman
Montreal Light, Heat & Power Consolidated.
Discussion
 8. "The Consulting Engineer and the Power Company."
By J. M. Robertson
J. M. Robertson & Co., Consulting Engineers, Montreal.
Discussion
- 4.00 p.m. Adjournment.

- 2.30 p.m. Special Entertainment for the Ladies.
4.05 p.m. Leave for Ste. Anne de Beaupre. (Ladies and Gentlemen).
6.00 p.m. Leave Ste. Anne de Beaupre for Montmorency Falls.
7.00 p.m. Dinner at Kent House. (For Ladies and Gentlemen).
Speakers:
The President, N.E.L.A., N.Y.
W. L. Goodwin, Society for Electrical Development, Inc., N.Y.
and one or two other prominent speakers.
9.30 p.m. Dancing.

THURSDAY MORNING—June 16, 9.30 a.m.
(This session will be held at the "Empire" Theatre, opposite the City Hall, five minutes from Chateau).

9. Paper on "Modern Street Lighting." (With lantern slides).
By A. B. Cooper
Canadian General Electric Co., Toronto.
Discussion
10. Paper on "Electrons." (With lantern slides).
By W. B. Cartmel.
Northern Electric Co.
Discussion
11. Paper on "Switching Equipment." (With lantern slides).
By L. B. Chubbuck
Canadian Westinghouse Co., Hamilton.
Discussion
12. Paper on "The Manufacture and Testing of High Tension Porcelain Insulators." (With lantern slides).
By A. D. Allen.
A. D. Allen Inspection Co., Hamilton.
Discussion
Moving Pictures if time permits.
12.30 p.m. Adjournment for Luncheon.

THURSDAY AFTERNOON—2.00 p.m. (Chateau).

13. Report from Accounting Section.
Chairman: Col. D. R. Street.
Ottawa Electric Co.
Discussion
14. Report from Public Relations Section.
Chairman: D. H. McDougall.
Toronto Power Co.
Discussion
15. Report from Accident Prevention Committee.
Chairman: Wills MacLachlan
Consulting Engineer, Toronto
Discussion.
16. Report of Membership Committee.
Chairman: M. K. Pike
Northern Electric Co.
Discussion.
17. Report from Representatives on Canadian Engineering Standards Association.
Pole Specifications - O. V. Anderson.
Toronto Power Co.
Electrical Appliances and Supplies.
E. C. McGovern
Northern Electric Co.
Transformers - A. A. Dion.
Ottawa Electric Co.
18. Report on Activities of Toronto Section and St. Maurice Valley Section.
4.00 p.m. Adjournment.

- 2.30 p.m. Sight-seeing trip for the ladies on Observation Cars to meet rest of Delegates at 4.15 p.m.
4.15 p.m. Leave King's Wharf for boat trip around the harbour, up to Quebec Bridge and back.

THURSDAY EVENING

Get together smoker and entertainments in co-operation with Electrical Co-operative Association of the Province of Quebec.
Bridge for the Ladies.

FRIDAY MORNING—June 17, 10 a.m.
Classes "A" and "D" Executive Session.

Association of Municipal Electrical Utilities of Ontario

PROGRAMME OF CONVENTION

At The Clifton, Niagara Falls, Ontario, June 23rd, 24th and 25th, 1921

THURSDAY—June 23.

Morning.

Registration at The Clifton.

Afternoon. 2.30 o'clock.

President's Address.

Reports.

Revision of Constitution and By-laws.

Addresses by Commercial Members on the following subjects:

- (a) "Advertising" by L. J. Cuniff, H. K. McCann Co., Toronto.
- (b) "Window Dressing" by A. S. Edgar, Mgr. Supply Dept. Can. Gen. Electric Co., Toronto.
- (c) "Sales Campaigns" by E. H. Porte, Gen. Mgr. Renfrew Electric Products, Limited, Renfrew.
- (d) "Service in Merchandising" by G. W. Blay, Mgr. Appliance Dept., Public Utilities Commission, London.

Evening. 6.30 o'clock.

Convention Dinner, at The Clifton, followed by a few short spicy addresses. (Tickets will be obtained at time of Registration, subscription \$2.00).

8.30 o'clock.

A tour through Monte Carlo, personally conducted by Mr. Geo. D. Leacock.

FRIDAY—June 24.

Morning. 9.30 o'clock.

Illustrated Address—"Power Supply in Rural Communities" by J. W. Purcell, Farms Engineer,

Hydro Electric Power Commission of Ontario.

Afternoon. 2.30 o'clock.

Paper—"Safeguarding The Users of Electrical Appliances" by W. C. Cale, Assistant Laboratory Engineer, Hydro Electric Power Commission of Ontario.

4.30 o'clock.

Base Ball Match. 60 cycle, L. G. Ireland, Capt. versus 25 cycle, Geo. D. Leacock, Capt.

Indoor equipment. Special rules.

Evening. 9.00 o'clock.

Convention Dance. Informal. Your badge admits you and your wife.

SATURDAY—June 25.

Morning.

Tour of the Chippawa-Queenston Power Development. Special cars of the International Railway will transport the delegates from The Clifton to the fore-bay, leaving The Clifton at 9.00 o'clock. The delegates will be carried over the work returning by N.S. & T. Ry., arriving at The Clifton in time for lunch at 2.00 o'clock p.m.

Commercial Exhibit.

There will be an exhibit by the Commercial Members during the whole time of the Convention.

Ladies.

The Conventions Committee has undertaken to provide special entertainment for the wives of delegates to the Convention. Further announcements will be made during the first afternoon session.



S. R. A. Clement, secretary.



M. J. McHenry, president



R. H. Martindale, vice-president

The Electrical Contractor

Practicability of Ascertaining Labor Costs from Experience Based on Actual Operations

By CAMPBELL HIGGINS

Estimator for Hatzel and Buehler, N.Y.

Having been requested by the members of the Electrical Estimators' Association of Greater New York to submit a paper on Labor Costs with particular reference to the practicability of ascertaining such costs from actual operations, I take pleasure in submitting the following report which is based entirely on practical experience over a period of four years.

I do not claim that this system is entirely free from defects, and I am sure that many improvements will be made as soon as it comes into more general use, but I do wish to emphasize the fact that this method of arriving at labor costs is entirely practical and its use will result in the accumulation of extremely accurate costs in a convenient form, without appreciable expense.

We all know how often attempts along this line have been made, only to be abandoned, and I am sure that in most cases the trouble has been due to an attempt to obtain too many details or because the results were obviously incorrect.

The first step in developing a cost system of this kind is to find a practical and easy method of charging the labor to the desired operations or items. I have been asked repeatedly how I succeeded in getting the foreman on the job to make the proper subdivisions of the labor, and before going further I will endeavor to cover this important point by describing exactly what the foreman does.

What the Foreman Does

At the end of the day or the first thing in the morning when making the payroll, the foreman notes on a slip of paper the total number of hours recorded in the time book for each class of labor. On a small job, for example, he would have:

Foreman 8 hours	\$10.00
Wiremen 16 hours	18.00
Helpers 24 hours	16.50

Total\$44.50

The foreman then readily recalls that the two teams were working on branch conduit the entire day and that he and his helper were laying out and marking centres on the floor above all morning, and during the afternoon he set the first floor panel box which took about one hour, and the remainder of the afternoon he and his helper were working on the two-inch conduit riser. Setting these items down as he recalls them he will arrive at the following figures:

½ in. and ¾ in. Conduit, Team 16 hours	.....\$29.00
Laying Out Work, Foreman and Helper, 4 hrs.	7.75
Setting Panel Box (Light), Foreman and Helper, 1 hr.	1.94
2 in. Conduit, Foreman and Helper 3 hrs.	5.81

Total\$44.50

The important part is now done and all that remains is to enter the four amounts under the proper item numbers in the book, at the same time recording the total payroll for the day under its own separate heading.

I have no desire to make this operation seem any easier than it is; but the example given is typical of most days on the average job. As a matter of fact a foreman will soon become familiar with the item numbers and will use them as a substitute for the descriptive matter together with abbreviations of the other words, and you can see that the amount of time involved is not serious. To make this task easier a rate card without fractions is provided, giving the amount for each rate from one to eight hours and for multiples of eight hours.

As a rule a foreman will have no difficulty in keeping the time for the number of men working directly under him, provided of course that he makes up his book daily. On an extremely large job the subforeman, or straw boss, is relied on for the subdivision of time for those working under him. This last method was used successfully on a job where from fifty to sixty men were regularly employed, each subforeman turning in his report daily to the time clerk, whose duty it was to make up the final sheet and submit it to the superintendent before entering in the book.

In actual practice I have found very few foremen who experienced difficulty with the task; in fact most of them will do the work willingly and in a very short time once they are interested and understand what is desired. However, until the foreman is thoroughly familiar with the system it has always been necessary to keep in contact with him, visiting the job occasionally to see that he is keeping his book along the lines intended.

I do not wish to create the impression that a foreman who is unfamiliar with the method will obtain the desired results without any effort on your part. If you merely give him the list of items and a general outline of what he is to do you will certainly get a lot of costs, but the chances are that you won't have very much confidence in applying them to new work. It does not make so much difference how the costs are kept, but it is absolutely necessary that the man who is going to use the results be thoroughly familiar with the method used by the foreman in keeping them. For this reason the more nearly all the foremen work to the same system, the more usable will the results be.

Starting Right

Even on a job of moderate size a foreman is required to keep a good many records and he is prone to feel that any additional work of this kind is uncalled for. It is wise therefore to make his initial experience with this new idea a pleasant one. I have found that the best way to avoid the necessity of making corrections is to go to the job about two days after the material has arrived and start the book myself, having some days previously discussed the matter in a general way with the foreman.

Knowing approximately what has been done to date you

will be able to bring the record up to date by asking a few questions and letting the man do his own figuring. It will not require more than a half hour at the outside, and the result will be a very favorable impression on his part, for if five or six days can be disposed of in a half hour, one day will not be serious when taken alone.

The classification of labor cost items now in use is the result of numerous changes, and the unit labor costs now obtained on various jobs can be compared, and estimated labor units for new work readily applied.

The list of items submitted herewith covers practically any job, and I would like to point out the fact that not more than thirty or forty of these items will be required on any one job.

The total payroll charged to the job is divided into the following main sub-divisions:

1—Non-Productive Labor

Covering all work which does not directly result in bringing the installation nearer to completion.

I have found that the best way to define this distinction is by stating that the item of non-productive labor covers all work which is not done with the tools or hands, while the productive labor is performed by men working with the tools or hands. For the purposes of cost-keeping, the labor expended on temporary light and power is regarded as non-productive, as well as the labor involved in tearing out work and replacing material already installed and previously recorded.

It will be obvious that an error would result from charging the cost of installing any material to the usual item a second time, for the reason that the unit costs are derived from the net amount of material used on the job, as will be explained later.

2—Roughing (Or Conduit Work)

This heading covers the entire cost of the pipe work, including panel boxes and pull boxes.

A glance at the detailed classification will show that the entire cost of installing the branch circuit conduit, including all outlet boxes, is kept as one item, and no attempt is made to arrive at the cost of installing an outlet box.

In this connection I would like to explain that all attempts to obtain costs on installing outlet boxes separate from the cost of conduit work have failed. Each foreman undertook to make the desired separation, but the results indicated that this separation was purely arbitrary (for the reason that both operations are usually simultaneous), and therefore a wide variation in the cost of installing outlet boxes was recorded.

For this reason it was decided to keep the costs on this item in the only practical and sure way, and to record the length of conduit run between outlets of all kinds. In other words, to establish the average length of run between outlets, including ceiling outlets, brackets, switch receptacles, etc., as well as low tension outlets, a difference of one or two feet in the average length of run between outlets will, under the same conditions, be reflected in a variation in the unit labor cost.

3—Pulling Wire

This heading covers the cost of pulling the various sizes grouped together, but not the cost of connecting, which is usually done at a later date and is more readily applied to the apparatus connected. The cost per thousand feet is recorded as being the easiest unit to remember.

4—Switchboards, Panel Boards and Apparatus

This heading covers the costs indicated, and on a job of

moderate size the items under this group may readily be considered a part of the fifth and last classification.

5—Connecting and Finishing

No effort has been made to carry this list out to its logical conclusion. The items indicated will, I am sure, prove sufficient when taken in connection with the blank spaces.

You will note that the detailed list of labor items are arranged that the unit costs arrived at in most cases correspond with the items of material appearing in an estimate, and are therefore convenient, as the units can be quickly applied by an experienced man, while the extensions can be made by any one. In this connection I would like to point out that ninety per cent of the labor on the average job can be figured by the application of about two dozen unit labor costs, many of which do not tend to change with the various building conditions, and can therefore be used as standard in practically all cases; others will vary slightly within certain definite limits; while others, particularly the costs on conduit, will vary to a considerable extent. Where variations occur it will be found that some definitely known condition is responsible, and in many instances these conditions can be forecast with a fair amount of accuracy when figuring new work.

We will all agree that our work is mainly a matter of numerous repetitions of very small items, and for this reason it will be found that at least eighty per cent of the labor on a job can be figured with only a very limited number of costs at hand, and if this part of the labor estimate is correct the chance of making a serious error in the remainder is extremely small.

Before closing I would like to give you a general outline of the points which must be taken into consideration in arriving at labor costs on the electrical installations:

General Outline

1—The costs estimated must be approximately correct, and therefore both the intermediate steps and the final results must be readily subject to check.

2—The total labor charged to the job must be accounted for in arriving at the unit labor costs. Experience indicates that costs based on partial records are apt to be misleading and are therefore misleading.

3—The selection of items in which costs are to be kept must be made with due regard for the possibilities of keeping each item accurately and therefore no element of judgment on the part of the individual making the charges should be introduced, otherwise the personal equation of the individual will make it impossible to use the results intelligently.

4—The items to be used, when once established, should be standardized so that the results on various jobs can be compared, improvements due to different methods of installations can be noted, and lastly for the reason that the various employees may become familiar with the system and may see that the results are obtained in the same way on all jobs.

5—The daily payroll must be figured and charged to the items selected by the foreman whose duty it is to assign the workmen to their daily work, for he is the only man who can know what each workman is doing, and therefore he is the only man who cannot dodge this responsibility should the accuracy of the results be questioned.

6—The items selected must be very clearly described and in sufficient detail to remove the possibility of misunderstanding on the part of the foreman, and blank item numbers should be provided for the recording of unusual work. It is much easier to add several such items than it is desired than to make an arbitrary division of one charge covering two operations. On the other hand, to provide a

larger number of items than the foreman can readily become familiar with is unwise.

7—No attempt to record the material installed daily should be made for this method of obtaining the quantities has been found to be impractical, to consume an enormous amount of time, and the results are always found to be in error when checked at the end of the job. It will be found that the quantities can be far more readily and accurately obtained from the vouchers or invoices themselves, together with the credit slips. It will of course be necessary to obtain a few of the quantities from the plans or from the foreman, as for instance the number of outlets and general descriptions.

8—The final tabulations of the results should be performed by some individual, other than the foreman, who is sufficiently familiar with the job, to note any obvious discrepancy in the total amount of any class of material, and this individual should consult with the foreman and apply all possible checks in carrying out the work of tabulation.

9—The results should be recorded in an orderly and logical way for future reference and the quantities of material upon which each unit cost is based should be recorded so that a fair idea of the value of the unit can be had. Notes should also be made covering the type of building and floor construction, the general conditions experienced, the foreman's name, and the existing rate of pay.

10—Lastly, having used every possible means of getting the true cost and eliminating large errors, the results and the fact that they are being used, should be communicated verbally to the foreman who handled the job, for nothing will tend to produce interest in his part of the work so much as the knowledge that the results are of importance, and nothing will keep up his interest once he feels that the results of his work are not being used.

Importance of Accuracy

I have found it impractical to apply this system to more jobs than could be properly handled in the office, but have preferred to keep a smaller number of accurate costs rather than a larger number of records, the accuracy of which might be subject to serious doubt.

I am firmly convinced that the slight amount of time consumed in keeping the daily record is more than offset by an unconscious effort on the part of the foreman to make a good showing, to say nothing of the beneficial results of thoroughly knowing the conditions on the job and the possibilities of making improvements in the method of handling work.

No distinction is made between the work done under the contract and that done on extra orders if any are experienced, except where work is removed and replaced, the entire installation being regarded as a whole as far as costs are concerned. However, the proportion of extra work should be recorded as an explanation of the higher unit costs resulting.

I trust that the members of this association will become interested in the question of keeping labor costs and I strongly urge all of you to make a real effort along this line. The difficulties are not serious and the knowledge that you can price the various items in an estimate with definitely known labor costs gives one a most satisfactory feeling of confidence in the amount of labor allowed for the job.

How to Make Schedule

Use an ordinary cash book or account book ruled for dollars and cents and on the first page enter the total payroll for each day, giving the date. The amount should be taken from the time book.

Read the complete list of labor cost items, carefully noting the general groups and methods of arrangement.

Having allowed sufficient space for the payroll, on succeeding pages open accounts for each of the nine items under

Non-Productive Labor and all other items which are required on the job under consideration.

Use at least one page for each item and copy the title as well as the number at the top of the page.

Once each week add the individual items and compare with the payroll as recorded in this book, correcting any error.

Incorporate this list in the book and refer to it frequently. It will be found that a good way to index the book is to note the page numbers opposite item numbers on the list.

In making subdivisions of time it is generally sufficient to work to the nearest hour.

Non-Productive Labor

Under the first six headings record all time which is not of a directly productive nature. This generally includes all work not done with the hands or tools:

1. Erecting shanty, stock room, work benches, etc.
2. Clerical work—stock keeping—time keeping.
3. Running errands, etc.
4. Laying out work.
5. General supervision.
6. Handling materials, unloading, etc.
7. Tearing out work, and replacing any work or material already installed under this contract.
8. Temporary light and power.
9. (Blank line).

Roughing

Record all labor cost under the items given, making no distinction between contract and extras. Material will be obtained from office records.

10. Installing $\frac{1}{2}$ in. and $\frac{3}{4}$ in. Conduit Concealed, including all outlet boxes.
11. Installing 1 in. and $1\frac{1}{4}$ in. Conduit Concealed.
12. Installing $1\frac{1}{2}$ in. and 2 in. Conduit Concealed.
13. Installing $2\frac{1}{2}$ in. and 3 in. Conduit Concealed.
14. Installing $3\frac{1}{2}$ in. and 4 in. Conduit Concealed.
15. Installing $\frac{1}{2}$ in. and $\frac{3}{4}$ in. Conduit Exposed, including all outlet boxes.
16. Installing 1 in. and $1\frac{1}{4}$ in. Conduit Exposed.
17. Installing $1\frac{1}{2}$ in. and 2 in. Conduit Exposed.
18. Installing $2\frac{1}{2}$ in. and 3 in. Conduit Exposed.
19. Installing $3\frac{1}{2}$ in. and 4 in. Conduit Exposed.
20. Installing hangers for main conduits.
21. Setting Panel Boxes for lighting (Give details).
22. Setting Panel Boxes for power. (Give details).
23. Setting Boxes for motor switches. (Give details).
24. Setting cutout Boxes.
25. Setting Low Tension interconnection boxes.
26. Cutting chases for circuit work. (Give details).
27. Cutting chases for mains. (Give details).
28. Installing Metal Moulding, including outlets.
29. Correcting Manufacturers' Mistakes in panel boxes, etc.
- 30 to 35. Blank lines.

Pulling Wires

Under these headings it is intended to record only the cost of pulling. If it is found necessary to include the cost of testing, splicing and tagging branch circuits, please note

40. Pulling in No. 14 and No. 12 duplex.
41. Pulling in No. 10-8 and 6 single.
42. Pulling in No. 5-4-3-2-1 single.
43. Pulling in No. 1/0, 2/0, 3/0, 4/0.
44. Pulling in No. 300,000 and 400,000 cm.
45. Pulling in No. 500,000 and 600,000 cm.
46. Pulling in No. 700,000—800,000—1,000,000 cm.
47. Pulling in No. 18 and No. 16 single.
48. Pulling in special cables.
49. Running No. 14 and No. 12 single. Cleat Work.
50. Running No. 10, 8, 6 single. Cleat work.
51. Running No. 5, 4, 3, 2, 1 single. Cleat work.
52. Running No. 1/0 to 4/0 single. Cleat work.
53. Running No. 300,000 and 400,000 cm. Cleat work.
54. Running No. 500,000 and 600,000 cm. Cleat work.
55. Running No. 700,000 to 1,000,000 cm. Cleat work.
56. Running BX New Work.
57. Running BX Fish Work.
58. Installing crane trolley wires complete.
59. Installing crane trolley insulators and blocks
- 60 to 65. Blank lines.

Switch Board, Panels and Apparatus

Describe fully the operation included under any item on which Costs are kept. Use blank spaces for further subdivision when desired.

70. Erecting and connecting lighting switchboard.
71. Erecting and connecting power switchboard.

72. Setting and connecting lighting panelboards and trims.
 73. Setting and connecting power panelboards and trims.
 74. Installing and connecting Motor switches 30 to 100 Amps.
 75. Installing and connecting Motor switches, 200 to larger.
 76. Installing and connecting Porcelain cutouts.
 77. Installing and connecting Main Line cutouts, 30 to 100 Amps.
 78. Installing and connecting Main Line cutouts, 200 to 400 Amps.
 79. Installing and connecting Meter Boards.
 80. Installing and connecting Service Switch.
 81. Installing and connecting D. C. Motor Starters.
 82. Installing and connecting A. C. Motor Starters.
 83. Installing and connecting A.C. Motor Starters.
 84. Installing and connecting D. C. Motors, 1 to 10 H.P.
 85. Installing and connecting D. C. Motors, 15 to 25 H.P.
 86. Installing and connecting A. C. Motors, 1 to 10 H.P.
 87. Installing and connecting A. C. Motors, 15 to 25 H.P.
 88. Installing and connecting Motor Generator set.
 89. Wiring cranes complete.
 90. Setting and connecting Transformers. (Give details).
 91. Correcting Manufacturers' Mistakes in panels, etc.
 - 92 to 99. Blank lines.
- Finishing**
100. Installing and connecting wall switches and plug receptacles, including plates.
 101. Installing and connecting floor receptacles.
 102. Installing and connecting Lamp receptacles.
 103. Installing and connecting W. P. or special receptacles and guards.
 104. Installing Exit Signs.
 105. Making up and installing Drop Cords.
 106. Hanging and connecting Fixtures.
 107. Hanging and connecting Fixtures.
 108. Hanging and connecting Fixtures.
 109. Assembling and hanging Cooper Hewitts.
 110. Tapping outlets.
 111. Putting in lamps.
 112. Fusing up.
 113. Testing light and power circuits.
 114. Painting.
 115. Making splices in feeders.
 - 116 and 117. Blank lines.
 118. Installing and connecting Push Buttons (bell work).
 119. Installing and connecting Bells 3 in., 4 in., 6 in.
 120. Installing and connecting Buzzers.
 121. Installing and connecting Gongs 8 in., 10 in., 12 in.
 122. Installing and connecting Fire Alarm Stations.
 123. Installing and connecting telephones (single stations).
 124. Installing and connecting Telephones (Intercommunicating).
 125. Installing and connecting Annunciators.
 126. Setting and connecting Interconnection strips.
 127. Making up and installing Pendant gear pushes.
 128. Connecting up Dry Batteries complete.
 129. Connecting up Storage Batteries complete.
 130. Installing and connecting Fire Alarm Control Board.
 131. Installing and connecting Potentiostat.
 132. Testing and adjusting low potential system.
 - 133 to 140. Blank lines.

Illumination Specialists

Make Survey of Store and Window Lighting

Find Very Large Percentage Rank as Bad or Medium—Offer to Assist Merchants to Improve Conditions

The Toronto Chapter of the Illuminating Engineering Society, the formation of which was announced in a recent issue, held their first general meeting on May 18 in the Engineers' Club rooms. A goodly number were in attendance, showing the interest that is already being taken in this organization.

An important announcement was made to the effect that the Society was prepared to give advice gratis regarding the improvement of any lighting installation, either in Toronto or elsewhere, if a fairly detailed plan were submitted with a general description of the layout. We understand that this offer has reached the ears of more than one merchant and that the activities of the Toronto Chapter are likely to be extended in the near future in this very practical manner.

An interesting item on the programme was a few explanatory remarks by Mr. Ben Tousley, of the Electric Outlet Company, who described the merits of his "Elexits" and demonstrated their use. This equipment has been described already in the Electrical News, and consists of a very ingenious arrangement for simplifying the hanging of electric fixtures, both wall and ceiling type. By their use fixtures are removed from the wall, or rehung, practically as one hangs his hat on the hall rack. It has been announced that Mr. Tousley will return at an early date—possibly on June 14—to address the electrical contractor-dealers of Toronto and the architects.

The chief item on the programme was a paper presented by Mr. Frank T. Groome. Some time ago it was suggested to the executive of the Toronto Chapter that they make a survey of lighting conditions in Toronto's store windows and report to the Society. Mr. Groome's paper included a very interesting report on such an investigation. We reprint the paper below in full, omitting, unfortunately, a number of excellent lantern slides:

With the intention of showing in what manner the problem of correct store and window illumination has been given attention in Toronto, and in order to have facts concerning the condition of the lighting of Toronto's stores and windows, it was suggested to the Executive Committee by one of its members and carried out in due course, that a survey should be made of several districts which might be called shopping centres, covering almost the whole of Toronto.

The conditions discovered showed it to be a fact that if destruction of human eyesight by the misuse of high-powered modern lamps was amenable to law, 50 per cent. of the store owners of Toronto would be guilty of criminal offence. The actual data gathered which leads to this statement will be given later on in this paper.

Let us first of all consider, however, the various salient features pertinent to good and bad window or store illumination.

Glare

Let us take **glare** as the first point to be considered, as this was discovered to be the most obvious condition to be overcome or corrected. When we know that the old fan type or fish tail gas flame was rated at 1,300 units of brightness; the candle flame at 1500; the kerosene flame at 2000, and the new nitrogen or type C lamps at 1,400,000 units of brightness, we can see why it is that these modern lamps when allowed to burn unprotected are so destructive to the eyesight.

Glare is said to be "light out of place" just as dirt is matter out of place. Glare causes discomfort, annoyance, interference with business, and eye fatigue, and we found glare very much in evidence in the large majority of Toronto's stores and store windows. The effect of glare on the eye is very serious. The human eye is a wonderful instrument and conditions such as this subject it to direct abuse. The definition of light is: **a form of energy that can be appreciated**

by the organ of sight. It follows then that light to be effectively used must satisfy the requirements of the eye. Light from any object in the field of vision passes through the iris diaphragm, through the lens and is focused upon the retina. The focus of the lens is adjusted for seeing distant or near objects by muscles which change the shape of the lens. The iris diaphragm acts as a safeguard for the retina. When the intensity of illumination suddenly increases the diaphragm opening automatically becomes smaller; the retina then adapts itself to the new illumination intensity and the diaphragm automatically opens to its normal size. The reverse happens when the illumination suddenly decreases. There are well defined upper and lower limits to the intensity of illumination that the retina can adapt itself to. When these limits are over-reached, the diaphragm no longer resumes its normal opening. The eye is then working under strain and defects of vision become acute.

To apply this if possible more simply, and to bring this discussion of the function of the human eye to its logical application to seeing the goods for sale in Toronto's stores and windows, let us put it in this way: When the direct light from a lamp enters the eye you see the lamp. If the light is first reflected from the lamp to the material to be illuminated, you see the materials. The materials in the store, or dress in the window, is illuminated by the lamp and is visible. When a lamp is placed in a store or window the object is not to have a source of light to look at but to illuminate the objects in the store or window, so that they can be seen distinctly and with comfort to the eye. Light is the cause; illumination is the effect; and the problem in designing a lighting system is to use light to obtain illumination without causing eye discomfort or strain.

With the increasing use of light sources of high brilliancy, as noted in the foregoing in Toronto stores, eye protection is most important. In any well-designed system the eye will be protected from the necessity of ever seeing a brilliant source of light or an extreme contrast of light and shade. To accomplish this, lamps in the ordinary field of vision should be properly shielded. When reflectors are used the reflectors should be deep enough to cut off a direct view of the lamp filament at all ordinary angles of vision.

Good Illumination Aids Speed of Vision

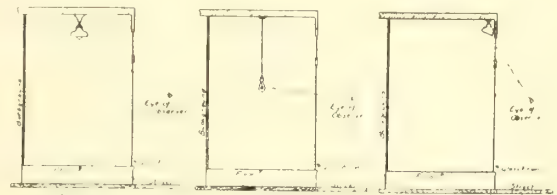
It would seem to be taken for granted by the trimmer of the average Toronto store window that all prospective purchasers might be embraced in that class of people who have perhaps already decided that they have need of the goods on display and therefore are disposed to **stand** and peer into the window so as to obtain the best idea possible of the character of goods on display and their values. It is absolutely necessary to **stand** opposite the average window and even to shield the eye from the glare of the bare lamps in order to see the goods. Apparently no window trimmer has thought of the possibility that a correctly illuminated display of the average line of goods in show windows, can be readily distinguishable by the passerby on a street car or automobile, and going at a fairly good speed at the time. It has been conclusively demonstrated that adequate and properly placed illumination is a very material aid to the speed of vision. Conversely, the eye has to take time to adjust itself to the glare of bare lamps in a window, and people will not take the necessary time, even on shopping expeditions, to get their eyes accustomed to glaring light sources, but will turn away and go to other better lighted displays. Or perhaps the very fact of the glare causing this momentary turning away will be the psychological turning point that will bring about the decision not to buy where there had previously been an almost definite intention to buy.

Window illumination is almost entirely an advertising proposition and costs less than 10 per cent. of that of any other equally effective medium. The show window is a small

stage for the purpose of displaying to the best advantage the various articles of commerce offered for sale. All of the arts of stage craft that go to produce an attractive setting for the players and the surroundings are applicable to the show window. The most important of these arts is lighting, and the use of light for this purpose involves intensity, direction, diffusion, color and accentuation (by means of spot light or otherwise). It is noticeable that none of the light sources used for stage lighting are visible to the audience. The same should apply to show window lighting. Lamps of various kinds often become parts of the setting in a stage scene. Their use in show windows for the same purpose is quite justifiable. A very important feature of this use of lamps is that they are largely decorative, which involves a low value of brightness so that they can be looked at in perfect comfort.

Color

We have dealt with glare; the human eye; have suggested the correct attitude towards store windows so as to bring home the basic thought of the window as being a stage, and now we come to another important factor in store and window illumination, more particularly window illumination, and that is **color**. The use of color is becoming more common in show window lighting, and unfortunately its misuse is already apparent. The committee during its survey viewed a fish store window which had a display of fresh



The two drawings to the left are bad practice. On the right the light is properly placed and directed.

salmon in slices and the lighting in the window was equipped with color screens with the result that this fish was shown under a combination of blue, amber and red lighting. Anyone looking at this fish would be sure to receive the impression that it had been on display much too long. The use of color in light can greatly enhance the beauty of a setting, or it can kill any beauty inherent in the setting. Color should not be applied by anyone who has not a certain amount of knowledge of the use of color as a decorative medium. Colors wrongly used often produce a weird and unnatural effect as that in the case of the fish display already noted.

When a daylight quality of light is used for the purpose of showing colored goods correctly, it should be higher in intensity than the surrounding unmodified light; otherwise the artificial daylight appears gloomy in contrast, with the more intense and warmer tones of the clear lamps.

In order to produce daylight quality and at the same time attain a warm appearance of the window, the back ground and trimmings can be of warm tones. The goods displayed are then shown in their true colors without the comparative bluishness of the light becoming apparent.

Jewelry stores should consider this character of color lighting for their diamond displays for the bringing out of that desirable blue-white sparkle. The windows of electrical dealers putting on a fan display on a hot summer day can make the same wonderfully effective by the use of a little light muslin covering for the window deck, with possibly just one fan set on it operating under illumination from this blue lighting. The effect is so cool that a display card bearing the suggestion "How Cool" is scarcely necessary. The suggestion of coolness is so real that the onlooker experiences something of the desirable sensation, plus a very strong

desire to buy. This is the result of all correct application of adequate illumination and color to window display.

Correct illumination is one of the most attractive influences we have. It marks the progressive store, invites the passerby, shows off the goods and makes sales.

What the Survey Showed

Let us now look at the figures resulting from the survey of store lighting mentioned at the beginning of this paper. In making this survey (it should be explained), in the visits to the various sections dealt with, one member of the committee reported bad lighting only, another member medium lighting, and a third good, and these three divisions only were made. Considerable latitude was allowed as to what constituted medium and certainly as to the kind of lighting that was called good. If any degree of strictness had been enforced the great majority of the stores listed as good would be reduced to the medium class without any discussion. The number of stores in Toronto that could be rated as excellent are exceptionally few. This survey being made in all cases after eight o'clock in the evening, many stores in each section were dark. Taking them, however, in sections, the figures are as follows:—

	Bad	Medium	Good
Dundas St. W., Clendennan to Royce	100	28	25
Bloor—Lansdowne to Shaw	105	56	10
Bloor—Clinton to Brunswick	24	6	16
Yonge—Bloor to King	92	121	136
Danforth—Broadview to Donlands ..	85	79	20
St. Clair—Oakwood to Lansdowne ..	45	15	9
Roncesvalles—Queen to Howard ...	10	17	2

There was one store passed in every district conspicuous by its excellent illumination, far ahead of all those surrounding it—this being Tamblin's. One or more of the chain occurred in each district and the quality of its illumination made it readily observable a block away.

It was our observation that in the vast majority of the stores inspected, the occupants were doing their level best to accommodate themselves to a condition which not only injured their eyes but must have had a very nerve-racking effect on the whole human system. Some of the stores are simply glare boxes that make the eye of the beholder jump when first looking toward them, and the adjustment of the eye to the glare condition was invariably accompanied by sharp pain. There is no doubt in our opinion that the owners and frequenters of these stores suffer this severe strain on the eyes, but not being educated to attribute the effect to the right source invariably will blame it on something else. We believe that a careful examination of these people and particularly the employees in the stores would reveal numerous cases of severe headache. The need of education along general illuminating lines on a big public scale has never been so obviously needful as at the present time.

In the Dundas West district almost all the stores were terrible examples of glare, so much so that it is almost impossible to read the name on the store window on account of the glare from within. The same condition applies on Bloor West, Queen Street East, Danforth Avenue, and Roncesvalles. It was also observable that among the worst examples were to be found the stores of electrical dealers.

There were three principal causes of this unsatisfactory condition:—

(1) Lamps entirely unprotected, hanging from the ceilings quite bare and always in the line of vision—some seven to eight feet from the floor.

(2) Lamps in shades or reflectors entirely unsuited the one to the other. For instance, shades or reflectors designed for 40 or 60 w. type B lamps with 75, 100, 150 and 200 watt lamps hanging out of them.

(3) Equipment—Bowls, balls, or fancy enclosing globes

with lamps in them much too big causing an intensely high surface brightness.

The extravagant waste of unreflected light is shown in the case of a window just given attention by a member of the executive. A hardware store having two windows approximately the same size a little less than 100 sq. feet each, had in each 6—200 w. lamps. The reflectors were of one of the best makes procurable, but of a size suitable for 60 w. lamps. A calculation showed that with a total flux in lumens generated of over 18,000 with only 50% effective, the intensity on the deck of the window should be 96 f.c. The f.c. meter reading, however, was actually 10-12, showing a waste of 80%. For every 10c for current and equipment only 2c value was obtained by the merchant. This is the story of all bare lamp installations and poorly designed layouts.

The question is—how can we educate the merchants of Toronto and bring them into a state of desire to correct these bad conditions and then see that the job is done right?

Dominion Steel Products Company Expanding

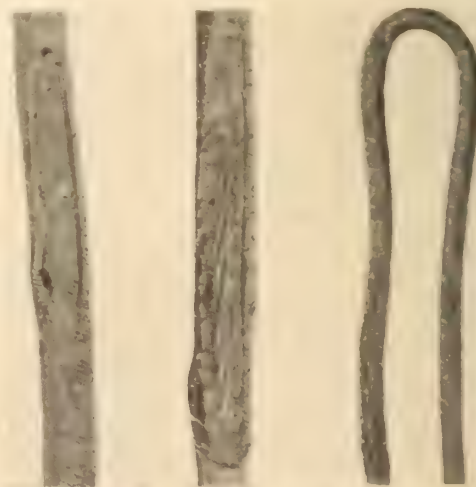
The Dominion Steel Products Company Limited, whose main office and factory is at Brantford, Canada, have just opened a sales branch at 418 St. James Street, Montreal, to handle Dominion Light Plants, as well as pulp and paper machinery, rolling mill equipment, Dominion chucks and other articles this company manufactures. This company have just arranged to manufacture in Canada the well known Darling valves and Darling fire hydrants. Their new Montreal branch will be in charge of Mr. Maurice P. Shea, who has had many years' experience in the machinery, valve and engine business. Mr. Shea for four years was overseas in command of a submarine chaser.

Lachapelle Engineering Company, Reg'd.

The firm of J. D. Lachapelle has changed its name to the Lachapelle Engineering Company, Reg'd, and has removed from 223 Notre Dame Street West to 414 St. James Street, Montreal, where an office and factory have been opened. The firm is distributing the catalogues of the Erie Electrical Equipment Company, Johnstown, Pa., makers of the Erie fittings.

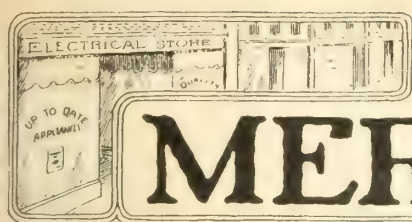
Damage to Lead-Covered Cables

We reproduce an interesting photograph herewith, through the kindness of Mr. E. V. Caton, chief engineer city of Winnipeg Hydro-electric System. These photo-

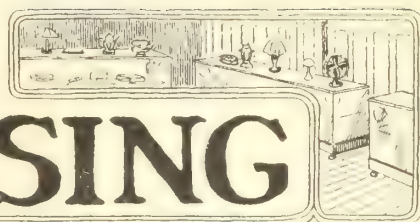


Rats damage lead-covered cables

graphs show damage done by rats to service cable in Winnipeg, and indicate the dangers to which lead covered cables are subject, unless properly protected



BETTER MERCHANDISING



Merchandising in the Electrical Industry

Ninety-five Per Cent of Electrical Contractor-Dealers Go to the Wall Within Three Years—What Can We Do to Correct This Condition?

By H. C. HOPKINS*

Within recent years the electrical industry has made remarkable progress in the development, manufacture and sale of electrical appliances. It is not so long ago that the entire activities of the industry were of an engineering character.

The rapid creation of the merchandising lines of electrical appliances found the industry without adequate machinery for proper distribution. It was natural that the first attempt at distribution should have been through the central stations, because the central stations were intensely interested in the sale of any current-consuming device, which would give them a load during the off-peak period.

Up to this time the few contractors who were in the business were interested primarily in wiring and the installation of engineering equipment such as motors and other industrial applications of electricity. His retail sales amounted to very little, consisting largely of lamps, sockets, wiring devices and electrical novelties. Distribution at this time also tended toward the department stores, hardware stores, and drug stores, simply because their retail establishments were known, and they offered an immediate outlet for the manufacturers' new products. It was soon found, however, that these channels of distribution were largely unsatisfactory because the distributors were not familiar with electrical practice and consequently could not give the service demanded by the public.

Jobber is Essential

We, in California, have long since recognized that the proper channel of distribution for the electrical merchandising line is from manufacturer to jobber, to retailer, to consumer. This arrangement insures the consumer the service of trained electrical men who are familiar with various electrical problems and are therefore able to give the advice and service demanded by the public. Through the untiring efforts of the California Electrical Co-operative Campaign, the retail branch of the electrical industry in this state has made remarkable progress toward modern merchandising methods. However, there is much work yet to be done and the efforts of the Co-operative Campaign should be supported by every man in the industry.

The growth of the electrical merchandising industry in the past few years is remarkable. In 1919 sales amounted to one billion and a half dollars, in 1920 two billion dollars, and it has been estimated that the sales for the year 1925 will reach the enormous total of ten billions of dollars. Surely no other business or industry offers the retailer such opportunity and prospect.

The manufacturer seeks to secure an adequate and permanent distribution for his merchandising products and the contractor-dealer is the natural and logical channel for such distribution. Properly to fulfil this important function, he must study, and become a merchant in the full sense of the word. The jobber must also study merchandising so as to be in a position to render service and give advice to his distributors. The jobber-salesman must equip himself so that he will be able to assist his dealer by suggestions.

95% Last Less Than 3 Years

To manage any business properly an accounting system is essential. For the electrical contractor-dealer the standard accounting system adopted by the National Association of Electrical Contractors and Dealers will be found satisfactory. This system will tell the exact condition of the business at any time, and provide an excellent system of store records. It has been estimated that 95 per cent. of electrical contractor-dealers fail within three years, due to an improper understanding of managerial problems.

Every merchant should keep a perpetual record of the stocks on hand. Such a record will tell what results are being obtained, and give warning before the stock gets out of proportion to the volume of business done. It indicates turnover and whether the rate of turnover is out of proportion to the total amount of stock carried.

We are rapidly getting back to normal and goods that were formerly hard to get will soon be available for immediate shipment from either the jobber's or the manufacturer's stock. Buying should therefore be given very careful attention. The retailer's stock must not be permitted to rise above the point where satisfactory turnover is assured; neither should it be allowed to fall below a certain point where service to his customers will be impaired. Considerations other than price may influence the buyer in his decision to purchase from a given source. The service that a local manufacturer may give him will frequently offset a decided price advantage of another manufacturer or jobber whose place of business is distant. The nearness of a local manufacturer's stock will enable the jobber or the retailer to serve his trade well with but a small quick turn in his stock in his warehouse or on his shelves. This indicates to the retailer the great advantage of a connection with a local jobber carrying adequate stock, and to the jobber the advantages of a connection with the manufacturer who studies the requirements of his jobbers and provides facilities adequate to give him good service. Therefore, a good rule to follow in buying is to buy just enough to supply your customers. By following this rule, turnover is bound to be fast.

Each line must be treated separately and studied individually to permit an accurate notion to be formed of whether or not it is sufficiently profitable to enable measures to be taken to improve its yield. It naturally follows that widely advertised merchandise may be more profitable to the merchant at smaller margins than unadvertised goods at higher margins. The retailer should, however, tie-in with the advertising by advertising himself to the public as a dealer in the

Consider the Banana-man

Turnover is nothing more than turn in your capital, and therefore turnover is the measure of the work each dollar in

*Journal of Electrical & Water Supply.

your business does for you. A good example of quick turnover is the fruit peddler seen on every street corner with his push-waggon. He puts his money into fruit every morning, sells his stock during the day and has his money back at night plus his profit. Assuming he makes 10% profit on the sale of fruit and works 26 days a month, his profits would amount to 260% on the capital invested monthly. Stock records and sales records must be kept to show the fast and slow moving lines, to guide buying and to increase turnover.

However, the retail merchant has only begun, when he completes the improvements in his accounting and sales records. Neither accounting nor sales records will help to sell goods of themselves, valuable as may be the help they provide. The progressive merchant will consider the gradual installation of display show cases, improved and regular shelving, betterment in arrangement and appearance, improved illumination, better show windows, increased facilities for the comfort and convenience of his patrons, and so on. He will seek an improvement in the character of his selling force, requiring of them neatness, courtesy and alertness. He will give them instruction in salesmanship, care of stock, and efficient demonstrating. His advertising should keep pace with the improvements in his establishment; the progressive retailer will not only follow the publicity leads given him by the manufacturers whom he represents, but he will also advertise the service he is prepared to give through the medium of his store. After all, the retail merchant is in business to render a service to the public—the service of distribution of the goods needed by the public. This principle should be instilled in the minds of salespeople and their sales activities guided with that one thought in mind. Adequate service means adequate profits.

Effective Displays

The importance of effective displays of merchandise is very frequently overlooked. The importance of showing goods attractively, correctly, and well price-tagged, is evidenced by the attention devoted to this phase of merchandising by the largest successful retail establishments. Any goods that can be sold through advertising can be sold through window displays if such windows are given proper thought and attention. Bad illumination will kill an otherwise good window display. The show window is probably the most valuable floor space in the retail store. The show window is the face of the retail business and indicates to the passer-by the character and class of business within. Window displays need not be elaborate or expensive to be effective. Simple displays conveying a single idea are usually the most effective.

The arrangement of merchandise within the store should receive as much attention and care as the arrangement of merchandise in the show window. The good impression created in the mind of a prospective buyer by a good window display must not be lost by a slovenly arrangement of goods within the store. Once inside the store, the customer is naturally interested in all merchandise on display, although possibly not intending to purchase more than one article. If properly displayed the merchandise may carry a message, which will bring the customer back at a later date or may cause him or her to purchase other goods besides those originally intended.

The merchandiser must above all know his goods. Be it an electric iron, a vacuum sweeper, or an incandescent lamp, he must be familiar with its construction, operation and application. He must be able and willing to demonstrate an appliance so that the customer will thoroughly understand its working and will thus be able to operate it without trouble, and the consequent loss of reputation of the article. Inquiries should always be made of the customer as to what application he desires to make of the lamp he wishes to purchase, and the merchandiser properly familiar with voltages,

wattages, types, sizes, etc., should be ready to advise the proper lamp to meet the customer's needs.

Know Your Stock

Furthermore, the merchandiser should know his stock. He should know, for instance, where his stock of 6-lb. irons is located. He should know exactly where to place his hand upon a given size and wattage of lamp. He should also know without consulting any record, the selling price of every article which he has for sale. He should be ready to give service, and supply his customer's requirements as quickly as the clerk in a drug store who, you will find, can immediately produce the article asked for and as quickly tell you the price. Prompt attention and prompt service will bring customers back for future purchases.

Members of the electrical industry are pulling together for the purpose of improving conditions in all branches, and are endeavoring to understand each other's problems. Dealers are now working together instead of competing by cut-throat and unfair practices. They realize that an increased distribution of almost any product creates an increased demand for that product and their services. Each of us can assist materially by doing our part to foster this get-together spirit, thus improving the relationship between the various branches of the industry.

Our reward will lie in the betterment of the conditions under which we shall operate in the future, in the perfection of our mutual relations and in the betterment of our services to the public.

Northern Electric Co. Holds Optimistic Sales Conference

The Montreal House organization of the Northern Electric Company, Limited, held a Sales Conference, May 12th and 13th, under the chairmanship of A. J. Soper, Montreal District manager. The president of the company, Mr. P. F. Sise, opened the Conference with a few remarks on general business conditions, emphasizing the fact that real sales effort was all that was needed to bring business back to par.

The reading of an inspiring and instructive set of papers covering every phase of the company's activities followed with round-table discussions in connection with each, this series comprising a programme that could not be other than beneficial to those in attendance. The following is the programme—

Programme

Hon. Chairman, M. K. Pike, General Sales Manager.
Chairman, A. J. Soper, District Manager

Thursday, May 12th, 1921, 9 a.m.

Opening of Conference	A. J. Soper
Address	P. F. Sise
"Our Goal"	N. S. Richards
"Our Manufactured Lines"	C. F. R. Jones
Paper—Wires and Cables	J. A. Weiss
Paper—Telephones	J. A. Weiss
"The Relationship of the Credit and Sales Departments"	J. H. Kimlin
"The Relationship of the Stores and Sales Departments"	G. Scott

Friday, May 13th, 1921, 9 a.m.

"Our Supply Lines"	L. A. Johnson, N. S. Richards
Paper—Power Apparatus	W. G. McCall
Paper—Wiring and Construction Materials	E. L. Allen
Paper—Storage Batteries	H. P. Fawcett
"A Field Man's Point of View"	T. G. Burnett

Discussion—Experiences Salesmen
 "Our Appliance Programme" L. A. Johnson
 Paper—Appliances A. L. Allsop

Many an optimistic note was struck in face of present unsatisfactory conditions in the business world, it being shown that during this re-adjustment period the main trend of the company's efforts was in constructive preparation for what Mr. Soper aptly termed "The turn of the business tide" so that thoroughly practical merchandising methods combined with a comprehensive knowledge of territorial conditions and a sound and consistent sales policy would enable it to efficiently cope with the immense business that is to come.

This sales policy was the subject of an address by M. K. Pike, general sales manager, and harmonizing as it does with the outstanding need of the whole electrical industry—a practical application of the Goodwin Plan—it is well worth detailed consideration in these columns. It definitely and actively allies the immense organization of the Northern Electric Company with those who are striving to build up the industry.

Mr. Pike's address may be summed up under three headings—purely internal matters of no direct interest to Electrical News readers; price protection, and relationship with the contractor-dealer. It is the two latter phases that we are treating here.

The Northern Electric Company's place in the electrical industry is that of a manufacturer and jobber and it believes in a policy of protection, on a basis of a fair margin of profit to all concerned. This is the foundation on which all co-operative effort must be built.

In discussing relationships, Mr. Pike spoke strongly on the upbuilding of the contractor-dealer. The Northern Electric Company will not knowingly sell direct to any small industrial not employing an electrical maintenance staff, as this class of business belongs to the contractor, and for such service as he renders he is entitled to payment. A lot of contractor-dealer troubles are traceable to the loss of this legitimate business through competitive effort that he cannot well overcome.

The contractor-dealer, on the other hand, obviously cannot render a service to a large industrial plant carrying an

electrical staff, and such concerns may rightly buy direct from the jobber. No one realizes the justice of this better than the contractor-dealer himself, but in the past not only this, but the small industrial business to which he is entitled has been largely taken away from him. He was losing out both ways.

The small industrial is recognized by the Northern Electric Company only as a consumer and therefore the customer of the contractor-dealer. The latter has an important part to play in the development of the electrical industry but he cannot be expected to perform it if the sinews, in the shape of profits to which he is entitled, are taken from him.

Mr. Pike also said that in furtherance of this programme **no outlet other than an electrical one would be recognized in distributing appliances and specialties.** This is electrical business pure and simple and as such the merchandise should reach the consuming public only through electrical outlets.

A mention was made of the highly encouraging showing of the electrical industry in British Columbia in face of adverse conditions in the three key industries of the province. Mr. Pike stated that this was only made possible through the close co-operation that existed in British Columbia among all electrical people, and that it stood out as an exemplification of what might be expected of a practical application of constructive principles. If such a measure of success could be obtained under poor conditions, what of the future when the wheels of industry are humming full-speed ahead?

Addresses on Northern Electric manufactured lines by C. F. R. Jones and on supply lines by L. A. Johnson, were also delivered, which showed very conclusively the thoroughness of the Northern Electric Company's merchandising line-up. This combined with the sales policy as covered by Mr. Pike in his address is sure to bring lasting results in increased sales for the company and progress on broad business lines in keeping with the aims of the electric co-operative movement in Canada.

The Northern Electric conference was concluded by a dinner and theatre party, a very large measure of the success of the two-day session being due to the organizing genius of Norman Richards, the popular Montreal District sales manager of the company.



Back row (L. to R.) C. A. Moodie; R. S. Berry; H. P. Faucher; C. R. McCarthy; T. Eaton; H. L. Reid; W. Anderson; G. L. Lopresti; G. A. Brown; E. Troy. Third row (L. to R.) A. S. Henry; C. T. Rappel; A. D. Smith; J. L. Stocker; F. W. Johnson; R. D. Harkness; J. W. Everett; A. A. Hunter; A. Black; A. Craig; W. R. Hilton; T. A. Farrell. Second row sitting (L. to R.) J. A. Royce; W. H. Smedley; C. F. R. Jones; N. S. Richards; M. K. Pike; A. J. Soper; L. A. Johnson; J. H. Kimlin; G. Scott; E. Fitt. Lower rows (L. to R.) L. F. Berman; E. L. Allan; J. P. Kavanagh; E. C. McGovern; F. R. McDunnough; A. H. Moore; J. J. Farrell; J. E. Germaine; D. Moriarity; J. A. Weiss; W. Brady; P. O. Roberts; N. S. Manson; T. O. Burnside; W. G. McGhie; A. F. Allsop; T. A. Lane; W. O. Taylor; G. R. Allerton.

Vancouver Approves Slogan "Buy Electric Goods in Electric Stores"

It is encouraging to see the unanimity with which the slogan "Buy electric Goods in Electric Stores" has been received by the whole electrical industry. As an example, we are advised that at the regular meeting of the Vancouver Association of Electrical Contractors and Dealers, held on Tuesday, May 10, the following resolution was unanimously passed:

"It having been authentically stated that the electrical stores of the City of Vancouver are as good, if not better, than in any other city of equal population on the American Continent, we, the members of the Vancouver Association of Electrical Contractors and Dealers, hereby request manufacturers of electrical appliances and supplies to market their goods through the medium of electrical stores only."

There are just two essentials in order that this slogan may be made effective. One is that we should all be unanimous that it is right—we are; the other is that the industry should be in a position to provide the general public with the service this slogan implies, that is, we must have enough electric stores, properly equipped, well stocked, and employing modern methods of merchandising.

There is no use railing against the selling of electrical appliances by hardware stores if hardware stores give better service than electrical stores. There is no reason why they should, and we believe there are very few cases where they do. The hardware store in general, as has been pointed out time and again, is rarely in sympathy with the electrical business nor is it equipped to give service if it were desirous of doing so.

The outstanding necessity of the industry, therefore, is good electric stores and efficient electric merchandising. The stores must be attractive; the salesmen must be skilled in all the methods for modern business getting.

What we seem to need most is a co-operative association in every district in Canada, composed of manufacturers, jobbers, contractors, dealers, central station men, electrical engineers, who will make it their business to see that the stores are available in sufficient numbers, strategically placed and properly equipped and manned. When this has been accomplished, our slogan "Buy Electric Goods in Electric Stores," will become a fact as a matter of course—the line of least resistance for the public to take.

Toronto Contractors Decide to Print Standard Estimate Sheet

The regular monthly meeting of the Toronto section of the Ontario Association of Electrical Contractors and Dealers was held in the Board of Trade Rooms, Royal Bank Building, on Tuesday evening, May 10th. Mr. E. C. Drury, president, was in the chair. The two chief items on the program were an address by Mr. C. D. Henderson, of the Henderson Business Service, Limited, and a final discussion on the Standard Estimate Sheet. Mr. Henderson explained his service and pointed out how the idea of marketing it among the contract-dealers of Canada had developed. He had first started this system in his own business; later a few fellow contractors in Brantford had tried it out and gradually its use had spread.

There was considerable discussion following Mr. Henderson's address in which Mr. McIntyre and Mr. Moss, particularly, made complimentary reference to the value of this service. Mr. Drury pointed to the difficulty that always arose where there was a difference in prices asked by dif-

ferent dealers. The cheaper ones got the business. Unless this service could be made practically universal the price-cutting dealer would demoralize the whole trade.

Mr. Gray urged that electrical appliances were not so much a matter of price as of value given and service rendered. The trouble seemed to be with the contractor and the dealer who were afraid to ask a decent profit.

The Estimate Sheet

There was considerable discussion also regarding the adoption of the Standard Estimate Sheet which had been prepared by a committee composed of Messrs. Gray, Rohleder and Kay. It was finally moved by Mr. McIntyre and seconded by Mr. George Davenport that "The District Executive Committee be authorized to secure five thousand copies of this standard form, to be sold at cost plus 25 per cent to members of the association and cost plus 50 per cent to non-members."

The license bill recently brought up in the local House by Mr. Swayze and which was reproduced in our last issue, will come in for considerable attention in the near future. A committee was appointed with Mr. Roxborough as chairman to work on this bill.

A committee was also formed to organize a good-sized delegation to the Buffalo Convention of the National Electrical Contractors and Dealers' Association. It was announced that Mr. Ed. Mack had already volunteered to place his two cars at the disposal of the members.

The next meeting will be held on June 14.

B. C. E. R. Co. Have Permanent Electrical House Exhibit

This illustration shows the exhibit of the British Columbia Electric Railway Company, Ltd., Vancouver, B.C., at a recent building show held in that city. The British Columbia Electric Railway Co. are great boosters for doing things

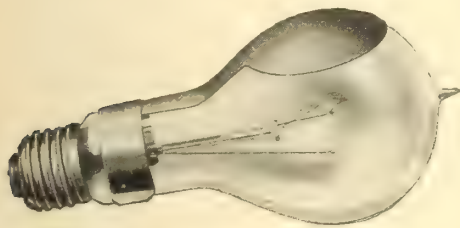


Model electrical home in Vancouver exhibit

electrically and are co-operating enthusiastically with the electrical associations. Their exhibit in this case took the form of a house with four rooms, featuring dining room, bedroom, laundry and kitchen. The electrical appliances and outlets were featured throughout and great interest was taken in the exhibit. The company have now erected this permanent exhibit in their own show rooms.

New Electrical Equipment

With the use of gas-filled lamps in signs practical experience has shown that there is quite a large percentage of breakage due to rain, snow and sleet coming in contact with the hot bulb which chills it so that it cracks. In actual installations a considerable number of failures were found with the 75 and 100 watt gas-filled lamps. When the gas-filled lamp is burned in a horizontal position the filament is quite close to the bulb directly above it, which results in a hot spot directly over the filament caused by the rise of the gas currents within the bulb. The sudden chilling of the glass when the rain or snow strikes leads to cracking of the bulb. Some device for preventing rain or snow is therefore necessary. On new signs provision can be made for attaching



Showing lamp with protecting cover.

some kind of a protective cover glass. This is not always possible or desirable. Several forms of the metal caps have been experimented with and have been found to reduce considerably this breakage. The metal cap illustrated in this article is made of brass and clips over the neck of the bulb covering securely the hot spot directly above the filament. These caps have been found to give very satisfactory service. In applying caps to lamps there are three points which should be carefully considered:

1. The round part of the cap must be centered directly above the middle of the filament.
2. See that the disc is bent down to fit tightly over the bulb. It may have become bent in shipping.
3. The spring clip should clamp tightly above the neck of the lamp so as to hold the cap securely in position.

This cap is manufactured by Reigelman & Forsythe, Cleveland, Ohio.

R. & M. Fans

The line of Robbins & Myers Fans for 1921 includes alternating and direct current ceiling fans, non-oscillating fans in 8, 9, 12 and 16-inch sizes; oscillating fans in 9, 12 and 16-inch sizes and ventilating fans in 12 and 16-inch sizes. The oscillating, non-oscillating and ventilating fans are made for service on all standard alternating and direct current circuits. The complete line of fans is also furnished for operation on 32-volt direct current farm lighting plant circuits. With the exception of the 8-inch fan, all oscillating and non-oscillating fans are made in the light weight drawn steel construction. Four blades is standard construction throughout the line. The bases are covered with a felt pad. All fans are furnished complete with cord and separable plug.

Have Reduced Price of Type H Iron

The Westinghouse Electric and Manufacturing Company in an effort to assist in bringing business back to sound and stable basis, has reduced the price of their Quality Household Electric Iron Type H. The general manufacturing conditions have not greatly changed in the past year as far as the cost of production is concerned, but this company believes that reductions must be made from time to time until business conditions are again normal.

45 Degree Angle Socket

The Ajax plural socket plug, double and triple type, is illustrated herewith. This is a 45 degree angle socket plug which admits the use of a shade with the same shade holders used on ordinary weather-proof sockets. The plug is made of cold mould, heat resisting composition and accommodates



Double Socket

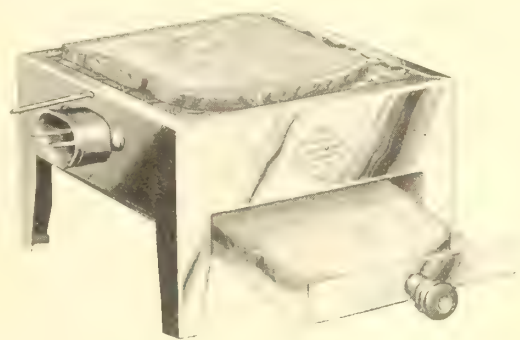


Triple Socket

any style of standard lamp. It is noted that either of these plugs leaves the lamp in its original position. It is manufactured by the Ajax Electric Specialty Company, Ajax Building, 1011 Market St., St. Louis, Mo.

Hubbell Twin Toaster-Grill

The Hubbell Twin Toaster-Grill is being placed on the market by the Hubbell Electric Products Co., 132-134 Simcoe St., Toronto. A feature of the sales proposition of this company is that the appliances may be purchased without the usual attachment cord. The appliance is equipped with



universal terminal contact designed to fit all plugs on attachment cords that accompany irons, toasters, and other electrical appliances now on the market. An open element with toasting tray below, so that toasting and cooking may be carried on at the same time, is another feature.

Back to Business

Mr. McFadden, of the Diamond State Fibre Company, Toronto, who has been confined to the hospital at Port Hope for several weeks with pleurisy, has fully recovered and is taking up his duties again as Ontario representative of the company.

The Ward Leonard Electric Co. are distributing an interesting folder on 110 volt plant accessories, including Vitrohm Battery Charging Rheostats, Circuit Breakers, Resistor Units, Motion Picture Rheostats, Light Dimmers, etc. The folder is illustrated.

Mr. J. A. Shaw, electrical engineer of the C. P. R., and Mr. R. J. Needham, electrical and mechanical engineer of the G. T. R., have been appointed members of the executive committee of the Canadian Railway Club, Montreal.

Folder 4455, entitled "Fans for Efficiency," which is descriptive of the Ventura Fans, has just been issued by the Westinghouse Electric and Manufacturing Company. This is a two-color folder.

Sample Rooms Available

Letters have been sent out by the Canadian Electrical Association to the effect that two sample rooms at the Chateau Frontenac will be available during the convention dates for the purpose of exhibiting various electrical products. The space used will be charged to the companies exhibiting on a pro rata basis for space occupied. Any members of classes D and F who desire to take advantage of this opportunity are asked to communicate as soon as possible with Mr. A. P. Doddridge, Chairman Reception Committee, C. E. A., c/o Quebec Railway, Light, Heat & Power Co., Quebec City.

Geo. C. Rough Sales Corporation

Mr. George C. Rough has opened an office at 134 Coristine Building, Montreal, under the name of The George C. Rough Sales Corporation. He has been appointed Canadian representative of the Duncan Meter, and is distributing descriptive bulletins. Mr. Rough says it is a wonderful meter, and that he hopes to demonstrate its many excellent features at the Canadian Electrical Association Convention at Quebec, and the Hydro Convention at Niagara Falls. He has also been appointed Canadian sales representative of the Walsh Plate & Structural Works, Ltd., of Drummondville, P.Q., which company fabricate and erect all kinds of steel plate work, as well as structural steel work for towers, tanks, bridges and buildings; also sales representative for the Montreal district, for The Volta Manufacturing Co., Ltd., of Welland, Ont., manufacturers of electric furnaces of all kinds, melting pots, winches, regulators, controllers, and special machinery of all kinds.

Canadian Triangle Conduit Catalogue

The Canadian Triangle Conduit Company, Ltd., Toronto, have just completed the preparation of a very interesting catalogue describing their products, which include "Tricable," a flexible steel armored conductor; "Tristeel," a flexible steel conduit; and "Triduct," a flexible non-metallic conduit. These products are manufactured and labelled under the supervision of the Underwriters' Laboratories. The illustrations accompanying this catalogue show how armored conductor is installed. Fig. 1 shows armored conductor used with standard 4-in. square conduit box with box connectors. Fig. 2 shows the same type of installation using a standard 3-in. octagon box with box connectors. Fig. 3 shows the use of "Tricable" armored conductor in connection with sectional switch or receptacle boxes. These boxes can be built up to accommodate 10 switches or receptacles. Each box is 2-in. x 3¼-in. and is equipped with clamps, doing away with the necessity of box connectors. They can be built up sectionally by removing the side partition, a simple operation.

Notes of the Trade

W. H. Reynolds, Winnipeg, Western manager of the Eugene F. Phillips Electrical Works, Ltd., left Winnipeg for Montreal on the 14th of May to attend the annual meeting of his firm. Mr. Reynolds is also visiting Phillipsdale, R.I., and Toronto, and expects to return to Winnipeg in the early part of June.

Bulletin 56, just issued by the Sangamo Electric Co., describes a special type of ampere hour meter designed to read any weight of metal deposits. This meter is, thus, specially designed for electro-plating plants. It is so constructed that it may be set to stop the plating operation when any desired weight of metal has been deposited.

The Onward Manufacturing Co., Kitchener, Ont., announce that they have just completed arrangements with Messrs. Blackadar & Stevens, Roy Building, Halifax, N.S., to act as their wholesale distributors for the Eureka Vacuum Cleaner for the Maritime provinces, that is, New Brunswick, Nova Scotia and Prince Edward Island.

They announce at the same time that Weber Sales Co., 862 Cambie St., Vancouver, will act as their distributors for the province of British Columbia.

Mr. G. Lorne Wiggs, the youngest son of Mr. W. H. Wiggs, president of the Mechanics Supply Co., Limited, received the degree of Bachelor of Science at the recent Convocation in McGill University, where he has taken a five-year course in Electrical Engineering.

Crouse-Hinds Company of Canada, Ltd., are distributing a bulletin on condulets, pointing out that condulets save money and ensure a clean-cut, effective electrical installation, fitting on the conduit as if a part of it. The great variety of condulets enables you to meet every need you may be called upon to provide for. The booklet contains a number of photographs of interesting conduit installations.

The Geo. C. Rough Sales Corporation, 134 Coristine Building, Montreal, are distributing bulletin No. 110, which deals intimately with Duncan a.c. watt-hour meters, single and polyphase. The bulletin is very thoroughly illustrated.

The Devoe Electric Switch Company, 414 Notre Dame St. W., Montreal, announce that they have opened an office and show room at 105 Victoria St., (room 116), Toronto, under the management of Mr. W. R. S. Careless, where they will be pleased to show their latest products to their patrons.

The 44th Convention of the National Electric Light Association will be held at the Hotel Mayfield in Denver.

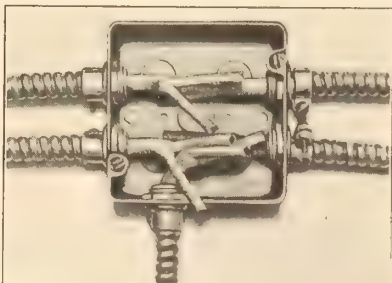


Fig. 1—Standard 4" square box.

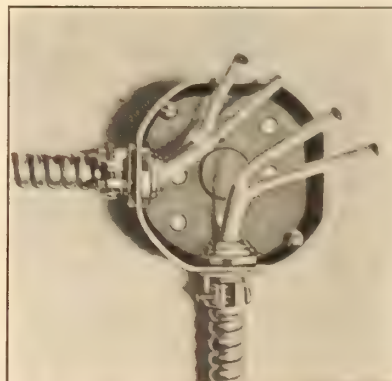


Fig. 2—Using standard 3" octagon box



Fig. 3—Using sectional box



Electric Railways

Electrolysis Mitigation by the Three-Wire System in Winnipeg

By W. NELSON SMITH

Consulting Electrical Engineer, Winnipeg Electric Railway Company

General Situation

For some years past the corrosion of cast-iron water mains in the city of Winnipeg, has been a subject of controversy between the City Administration and the Winnipeg Electric Railway Company, as potential differences existed in the railway tracks, which permitted a leakage of stray current to underground structures. In 1914, at the request of the Manitoba Public Utilities Commission, which had been established two years previously, the late Professor Ganz, of Hoboken, N.J., made a survey and reported on it in 1915. This report was summarized in a number of recommendations, establishing limits of track potential differences, calling for permanent means of observing them, and favoring an additional sub-station and insulated negative return feeders on the old two-wire system, which up to 1915, were the only methods considered practical for mitigating electrolysis conditions. The three-wire system had not then won the general recognition that it did a year or two later.

In view of the great capital expenditure, and the extra loss in power and car speed incident to the two wire return feeder system, Professor Ganz's report not only left the details of feeder distribution to the railway company, but expressed his recommendations so broadly as to enable the use of the three-wire system.

In 1917, the company installed a couple of negative boosters with insulated track feeders at two of its sub-stations. In the spring of 1918, as part of a contract between the railway company and the city of Winnipeg, which involved the abolition of jitneys by the city and the undertaking of various improvements by the company, the company agreed to follow the recommendations of Professor Ganz, as embodied in the "Electrolysis Act," which in the meantime had been passed by the Manitoba Legislature, making into law most of the Ganz recommendations with some modifications and omissions. The provisions of the Act respecting electrical drainage of underground cables, placed that matter under the jurisdiction of the commission. Drainage of water pipes is forbidden by the Act. This was the situation when the writer, in June, 1918, undertook the task of reducing the track potentials and gradients to within the prescribed legal limit.

Reasons for Choosing the Three-wire System

An engineering study of the situation showed very clearly that by reason of heavy car load and light weight rails, the same amount of copper would go very much further if used on the three-wire system of distribution, than with the two-wire system of insulated negative return feeders, which up to the time Professor Ganz made his examination and report, had been regarded as the only available practical method of reducing track potentials and stray currents. The process of

final adjustment in equalizing track potentials is also carried out more conveniently, by the three-wire than by the two-wire system. In view of the financial situation at the time, these advantages of the three-wire system were too important to be disregarded, even though it involved a departure from previously established standard ideas and methods.

The three-wire system was first worked out on a large practical scale on this continent in the Los Angeles district in California in 1915, (after Prof. Ganz made his report) and was so successful in reducing track potentials and gradients, and stopping the electrolysis troubles resulting from them, that the U. S. Bureau of Standards had paid special attention to its application, not hesitating to recommend its adoption in other places; and had formulated the theory of applying the three-wire system in practice along lines that would be of greatest service in automatically protecting underground cables as well as water pipes.

The Status of the Three-wire System in 1918

The state of the art in 1918 was very carefully investigated by the writer, who found that the three-wire system was then in successful operation in Brisbane, Australia; in the vicinity of Los Angeles, Calif.; Omaha, Neb., and Milwaukee, Wis., with installations projected for immediate use at Springfield, Mass., and Wilmington, Delaware, and recommended for New Orleans, La.

After getting the benefit of accumulated practical experience from various sources of first-hand engineering information, it appeared that the conditions of trolley distribution in Winnipeg lent themselves readily to changing the system over from two-wire to three-wire operation. The load is pretty heavy, the track rails are lighter than the average, the sub-station motor-generator units are of sizes available for balancing in three-wire operation with a minimum amount of rearrangement, and all permanent sub-stations but one had at least two machines. The feeder distribution is nearly all overhead. The trolley lines were originally subdivided into very few sections, and this fact had given rise to more or less inconvenience at times of accidental breaks in the trolley system, so that the operating staff rather welcomed the idea of sectioning the lines.

Operating Considerations

The paramount consideration was the reduction of track potentials and gradients, to within the limits required by law; so it was regarded as a matter of minor importance whether the cars of certain lines were kept continuously on the same feeder and trolley sections or not. It is sometimes thought that it is unwise to take a chance of stalling the cars of some particular line at one part of their run, by reason of some electrical failure that affects one section but not the others; but as the Winnipeg car lines are not susceptible to a great degree of segregation in the centre of the city, this feature did not require special treatment, and after more than a year's operation in one district, and some months' operation in two other districts, one of which is the central district of the city, there has developed no reason to revise the general arrangement of sectioning. Line failures are rare, and in extreme cases of emergency everything can be paralleled on the two wire system, if necessary.

The general method adopted for three wire operation is

the so-called "sectional method" in which the alternate sections of any double track or single track line are of opposite polarity, progressively along the line.

The general method of sectioning followed, is to set off three zones from each sub-station to the extremity of its feeding district, and to reverse the middle zone of the three. A number of variations have been made from this general standard to meet particular cases, but this general principle was the one adopted, it having been established by Mr. E. R. Shepard of the U. S. Bureau of Standards, that this combination offered the lowest reduction of track potential, combined with the tendency for stray currents in underground cables to flow continuously towards the sub-station, as compared with any other system of sectioning.

The Winnipeg Electric Railway Company's original system of sub-stations and railway generating units as arranged prior to 1918 was as follows: (See Map).

- No. 1. Mill St. station—1 1500 kw., 1 1200 kw., and 3 800 kw. M. G. sets.
- No. 2. Ft. Rouge sub-station—1 1000 kw.
- No. 3. St. James sub-station—1 1200 kw., 1 1000 kw.
- No. 4. North End sub-station—2 800 kw.
- No. 8. Logan Ave. sub-station—1 1200 kw.
- No. 10. Assiniboine sub-station—1 1400 kw.
- Total, 12,500 kw.

It has been realized that any scheme for the mitigation of electrolysis would probably necessitate the utilization of every pound of feeder copper that could be made available from the entire railway and lighting system of the company. It had therefore been decided before the writer was retained, that a new sub-station should be created in St. Boniface, east of the Red River, at a point contiguous to the right-of-way

of the 60,000-volt transmission line over which power is transmitted from the hydro-electric power plant to the receiving station at Mill Street; for by so doing, a heavy a.c. feeder of six 500,000 c.m. cables, about two miles in length, serving a large power customer could be nearly all salvaged for trolley feeder purposes, and certain important power customers in St. Boniface would be given very much better service. The first thing to do was to design and build this new sub-station. This was fitted up throughout with electrical equipment taken out of various other sub-stations of the railway company, where it was not working at full capacity. The transformer equipment comprised three 1000 and three 800 kw.—60,000/2200 volt transformers, much of the 2200 volt power being used for light and power customers in the vicinity.

To provide the trolley current for the lines on the east side of the Red River which this station was to feed, a motor-generator unit was created by reconstructing anew, from three disused engine-type generators removed from their engines, a three-unit railway motor-generator. The component machines consist of an 800 kw. 2200-volt alternator used as the motor, and two 400 kw. railway generators. The alternator originally ran at 90 r.p.m., and the railway machines at 100 r.p.m., but it was found upon testing the latter that they would operate satisfactorily at 90 r.p.m., so this combination was decided upon, and the machine designed, erected and operated as a 3-unit, 3-wire machine. Thus three-wire trolley distribution was made possible in most of the district east of the Red River, from the new St. Boniface sub-station. The load within easy reach of this sub-station was well within the capacity of this machine.

The first demonstration of three-wire operation, how



Skeleton map of Winnipeg showing railway lines, substations and three wire zones.

ever, was made in the district fed by the Ft. Rouge sub-station. One of the 800 kw. machines was taken out of Mill Street sub-station and moved to Ft. Rouge. The relatively small amount of change in the Ft. Rouge switchboard was made during the winter of 1918-19; some 6 or 7 miles of feeder copper were transplanted into the Ft. Rouge district, and the feeder system there rearranged; and on March 30, 1919, three-wire operation began in this district. It was successful from the start, though refined results were somewhat interfered with by the fact that the track potentials on the lines north of the Assiniboine River fed from stations No. 1 and No. 10, were exactly as they had been previously, and considerable return current going back to No. 10 station near Main Street from the district extending a mile or so to the west of it, was shunted through the railway tracks across the bridges over the Assiniboine River, and changed the track potentials in the tracks in the Fort Rouge district from what they would have been, had this shunting of track current been preventable.

Tests made in May, 1919, showed that the reduction of track potentials taken between the sub-station and the principal outlying points in the Ft. Rouge district, was from an average of 11 volts under two-wire operation, to an average of 3 volts under three-wire operation, a reduction of 73%.

These results were considered sufficiently good to warrant the extension of three-wire operation to the rest of the trolley system. On October 1, 1919, the three-unit railway motor-generator at the new St. Boniface sub-station above described, was placed in three-wire operation. The results in the St. Boniface district showed a reduction of the potential from St. Mary's road at the south city limits to St. Boniface sub-station, from 10 volts under two-wire operation, to 4 volts under three-wire operation; and the potential difference between the intersection at Tache and Marions streets, and the St. Boniface sub-station, around the loop, was reduced from 5 volts to 1 volt.

The Mill St. sub-station, which is the largest of any, had its switchboard changed over for three-wire operation during the first half of 1920, and on July 1, three-wire operation was begun in the central district of the city. Everything tested out perfectly the day before the change was to be made, and the system has worked with perfect smoothness under the most congested conditions of city traffic on the principal streets in the centre of the city. In this district, the initial reduction in cable drainage current was 62½ per cent. This will subsequently be further reduced, because the present zoning arrangement of this central district is such as to cover a considerably larger area than will be the case later, on account of the fact that the Sherbrooke sub-station is not yet completed, and the Mill Street sub-station now has to carry not only its own territory, but also that which will be ultimately carried by Sherbrooke.

General Plan of Changes in Distribution

In October, 1919, the writer submitted the complete plan for changing over the entire system to three-wire operation. This is shown on the attached map.

Among Professor Ganz's original recommendations in his 1915 report it had been suggested that a new sub-station should be constructed near the inter-section of Portage Ave. and Sherbrooke St., which is the centre of a fairly heavy load. The significance of this recommendation lies in the fact that it is ¾ miles from Mill St. sub-station No. 1, to the St. James sub-station No. 3, on the west city limits, and that the traffic on Portage Ave. is quite heavy with an appreciable traffic also to be cared for on Sherbrooke St., and on Sargent and Notre Dame Ave., the next adjacent lines on the north.

The Assiniboine sub-station No. 10, located on Main Street near the Assiniboine River bridge, had originally been the site of the first steam power plant and although the said

steam plant had been discontinued for a number of years, the building had still been continued as a source of electric railway distribution by installing a 1400 kw. motor-generator in it. This condition meant that No. 1 and No. 10 sub-stations together, they not being very far apart, fed a large district for about a mile west of Main Street, and all the return current naturally had to flow back east towards Main St., making a fairly heavy pitch or gradient of track potential all the way down Broadway, Portage Ave., Sargent Ave., and Notre Dame Ave., from Sherbrooke Street to Main St. The neutral point between Mill St. station and St. James sub-station was also near Sherbrooke St. It was thus logical, not only to transplant No. 10 sub-station to the west, but also to select a new site for it in the vicinity of Portage and Sherbrooke Streets.

As the whole situation thus pointed to the importance of reducing the track potential between Sherbrooke Street and Main Street, to the lowest possible amount, it was decided to transplant the Assiniboine Ave. 1400 kw. machine to a new sub-station to be built in the above-named locality, and add an 800 kw. machine from Mill St. to it, in order to get three-wire operation in the new Sherbrooke district; replacing the latter machine at Mill St. by creating another reconstructed motor-generator out of two old engine-type generators, (an 800 kw. alternator and an 850 kw. d.c. generator) still standing in the old Assiniboine steam plant. Three 833 kw. lowering transformers, and a 22,000-volt cable from Mill St. supply the power.

This plan has been carried out accordingly, the sub-station building on Sherbrooke St. is now completed, and the equipment is being installed in it. Two-wire operation, with the 800 kw. machine, has already been tried out from this station, and has shown that the track potential along Portage Ave. from Sherbrooke St. to Portage and Main Sts., about one mile, can be reduced from about 12 volts to 2 volts, and that with three-wire operation, the potential difference on this heavy line will be practically negligible.

Two-wire Operation Retained in One District

The Logan Avenue sub-station has but one machine in it, and as there is no other motor-generator available to pair with it for enabling three-wire operation, it was decided to extend the negative insulated return feeder system that had several years previously been installed there with a negative booster.

This station is to be fitted with a new arrangement of resistances in such a manner that the track in front of the station will be the point of lowest potential of the track system, which has not always been the case hitherto, due to faults in the original installation.

Cable Drainage

The three-wire system causes frequent reversals of stray current in underground cable sheaths, in districts where the traffic is light.

The scheme of cable drainage contemplates maintaining all present drainage connections into the sub-stations. When circumstances require, it is proposed to use small negative boosters, or "suckers," of about 1 kw. each with resistances in series, if needed, to assist in determining the inward direction of cable drainage current, subject to the approval of the Public Utilities Commission, which under the law has jurisdiction over the amount of drainage to be applied to all underground cables.

With the three-zone system of three-wire sectioning and

Convention of Association of Municipal Electrical Utilities of Ontario, Niagara Falls, June 23, 24, 25.

only two machines in a sub-station, the positive machine is apt to be overloaded, and the negative machine underloaded, when both are of the same size or nearly so. It has been found necessary in several cases to vary the zoning arrangement to favor the sub-station machinery by dividing the load more evenly between the two machines. Several outlying suburban lines reaching into distant districts have their polarity reversed, on account of the sparseness of parallel underground structures, but it is likely that positive and negative zones will have to be alternated frequently on light lines just within the outskirts of the city.

In the case of the North End sub-station, the two machines are of the same size, 800 kw. each, and the load in the district is already about as much as the two machines can carry. Consequently it has been necessary to cut the district up into more than three zones of opposite polarity in each direction, so as to have the aggregate negative load more nearly equal to the aggregate positive load. This has worked very successfully, and the cable drainage current predominates inward.

The method of sectioning the trolley wire consists simply of placing two standard section insulators in series, with the adjacent tips only a few inches apart. There have been no accidents whatever to the overhead construction from accidental short circuit, either between trolley wires or feeders of opposite polarity. The only accidental occurrences chargeable to the three-wire system have been an occasional short circuit caused by careless platform men placing both trolley poles of double-ended cars against the trolley wire on opposite sides of a 1200-volt breaker when turning cars, which happened in a very few instances when the central district of the city was changed to three-wire operation during the past summer. As the two breakers in series make a rigid spot in the trolley wire that causes the trolleys to wear out the breaker by pounding, it is probable that a single breaker with 16 inches of insulation, will be gradually substituted for each pair.

Permanent potential wires are installed from all outlying extremities to the sub-station in each district, connecting to a permanent recording track potential voltmeter in the sub-station from which charts can be taken at any time, thus enabling a constant check on the resulting distribution of track potentials. About 38 miles of No. 10 insulated weather proof wire are required.

The regulation regarding track potentials is as follows: " . . . the maximum potential difference between any two points one thousand (1000) feet or less apart on said rails or other metallic conductors will not exceed one (1) volt, and further, so that the potential difference between any two points more than one thousand (1000) feet apart on said rails or other metallic conductors will not exceed seven (7) volts, such maximum voltage drop to be the mean value between the highest momentary peak and the average for the thirty minutes of maximum load; but such track voltage requirements shall apply only on a business day and not to abnormal operating conditions brought about by fires, storms or the movement of crowds on holidays."

The above method of computing the average track voltage result, is not Prof. Ganz's, but was borrowed from the unofficial standard method used in England, of interpreting the British Board of Trade regulations. A little study will show that the legal average of a fluctuating voltage curve will be higher than the real average, in the proportion that the momentary peak exceeds the real average. Therefore, the actual average must be brought below 7 volts, if the legal average is not to exceed 7 volts. This very rigid restriction is being met in Winnipeg by the three-wire system in a very remarkable degree, even before the system is completed.

Completion of the system, hitherto delayed by the inability of manufacturers to promptly deliver even the sim-

plest details of electrical equipment, is looked for within a few months; and after the final adjustments have been made, a more comprehensive record of results actually accomplished, will be available.

Sub-station Changes

The changes in sub-station connections were very simple. Fortunately, many of the machine panels were already provided with double throw main switches, on account of the earliest installation of motor-generators having been designed to operate interchangeably with the railway circuits and with a commercial 500-volt power circuit, which is still maintained by the company. This fact was particularly helpful in working out the changes in the Mill Street sub-station which is the largest and most centrally located.

The principal task in arranging this switchboard, consisted in the addition of a new negative bus bar, and the installation of a heavy single-pole circuit breaker, which can connect the positive and negative buses by being closed when two-wire operation is desired. The breaker is maintained open for three-wire operation. This general principle of bus connection is followed in all the stations, excepting that in the smaller ones a heavy knife switch is used to connect and disconnect the positive and negative buses for changing from two-wire to three-wire operation.

The original internal connections of the machines themselves are not altered, and the relation between the field and armature connections of the generators is not changed when the polarity of the machine is reversed. Usually the same machine is always run on the same side of the system. The same feeders are also maintained permanently at the same polarity in order to establish fixed conditions of automatic cable drainage.

Interlocks are being devised which will automatically prevent mistakes by sub-station operators in throwing machine and bus bar switches when changing polarity.

The schedule of sub-station equipment, under the new arrangement will be as follows:—

Mill Street 1—1500 kw., 1—1200, 1—850, 1—800 . . .	4350
Ft. Rouge 1—1000, 1—800 . . .	1800
St. James 1—1200, 1—1000	2200
North End 2—800	1600
Logan 1—1200	1200
St. Boniface 2—400	800
Sherbrooke 1—1400, 1—800	2200

14,150

Interconnection of Stations

Another feature of this installation, which will be added to it during the next few months, is a system of feeder-tie switches to be mounted on poles at the boundaries of adjoining feeding districts and worked by control wires from the nearest sub-station, so that all the positive feeders and some of the negative ones, may be used to interconnect the sub-stations and operate the whole system in parallel on either the three-wire or two-wire system. This is intended to safeguard continuity of service on the three-wire system as much as possible in case of failures of machines in the sub-stations; to enable three-wire operation of the whole system throughout the entire 24 hours (it being customary to shut down all but the Mill Street sub-station from midnight till morning), and to change over to two-wire operation quickly if required in extreme emergencies.

The foregoing feeder rearrangement has so far been carried out without the purchase of any quantity of new feeder cable other than about 2 miles of No. 4 0, which, while not absolutely essential for feeder distribution, was deemed advisable as a supplementary to the trolley wires on several of the heaviest routes, to prevent overloading of the trolley wires, especially should one of the trolley wires happen to pull apart, which sometimes happens during the extreme

cold winter weather. The total amount of feeder cable in use in the trolley distribution system in the city of Winnipeg is about 75 miles, of which about 20 miles is being taken down and re-erected to feed the new arrangement of positive and negative sections, and to provide the above-mentioned system of tie feeders.

Investigation of Self-Corrosion

In all previous investigations and attempts at electrolysis mitigation in Winnipeg, the peculiar chemical composition of the soil in and about the city, had been ignored.

The deterioration and occasional complete destruction of underground structures, built of cement concrete, by the alkaline salts dissolved in the ground water, has been so widespread in Western Canada, that the engineering profession has been compelled to recognize the risk run by all such structures, and take steps to minimize it where possible. The general public is now aware of the continual jeopardy in which all buried concrete structures are placed, by virtue of being in soil containing a high content of soluble alkaline salts, which are mostly carbonates, sulphates and chlorides of magnesium, calcium and sodium, in combination.

The destruction of even the best concrete by these alkaline solutions in the soil, led the writer to institute an investigation, with the aid of a professional chemist of high standing, to determine the effects of the contact of such solutions upon cast iron and lead, both with and without access of stray electric current.

The investigation is not yet complete, but enough work has been done in the laboratory and corroborated by examinations of buried pipes in areas where stray current does not exist, to demonstrate that the customary attitude of blaming stray current from the railway for the widespread pipe corrosion in Winnipeg, under the existing soil conditions, is subject to considerable modification. The programme of the construction work necessary to achieve the reduced track potentials and gradients, will not, however, be altered in any way, by reason of this recently acquired knowledge of self-corrosion possibilities.

Organization

The field work in the foregoing programme has been done by the construction force of the electrical department of the Winnipeg Electric Railway Company. The earlier part of the work of execution comprising the design and construction of electrical details in Ft. Rouge, and the design of the electrical connections in St. Boniface sub-station, was begun by Mr. G. A. Mills, then electrical engineer, and brought to completion by Mr. Arthur Trott, electrical super-

intendent, who also had executive charge of designing and carrying out the details of all electrical switchboard changes at Mill Street, North End, St. Boniface and St. James stations, and of all details of the new electrical equipment at the Sherbrooke sub-station.

The difficult task of changing over the railway switchboard at Mill Street sub-station from two-wire to three-wire, was also laid out and executed by Mr. Trott, with the assistance of Mr. K. C. Ferguson. Their work also included the mechanical and electrical assembly of the reconstructed motor-generators. The trolley and feeder rearrangement was executed by Mr. O. W. Boyle, superintendent of electrical distribution. The mapping of the circuits, and working up the details for their rearrangement, together with the large amount of field testing required to prove out results, were done by Mr. H. G. Stewart. To the interest, foresight and loyal co-operation shown by the entire organization, is due the smoothness and the freedom from interruption, of electrical operation during the transition period. The execution of field work not yet completed, will be carried out by Mr. D. K. Lewis, recently appointed electrical engineer of the company.

The responsibility for the general conception, design and supervision of the entire scheme, and for the engineering procedure throughout, has been carried by the writer.

Canadian National Operating Battery Car

The Canadian National Railways are trying out the storage battery type of car on the line running between Trenton and Belleville, Ont., and the officials state that the initial performance of this car gives considerable promise. On the initial run out from Toronto 140.2 miles were made without recharging, in addition to which a demonstration was given of shunting two private cars weighing 208,000 lbs.

The car is equipped with an Edison battery of 250 cells, type A-12, with a normal capacity of 450 ampere hours. The actual amount of energy used over 108 miles of this trip was 49 kilowatt hours, which works out at 14 watt hours per ton mile—considerably less than the figure obtaining in street car operation.

It is the present intention to operate this car between Belleville and Trenton during the next month.

This battery type car was supplied to the Canadian National Railways by the Railway Storage Battery Car Co., New York. A photograph of the car, taken on its trial trip, is shown herewith.



Photo of battery car taken on trial trip Toronto to Belleville

Current News and Notes

Brantford, Ont.

The contract for building an addition to the Greenwich hydro sub-station at Brantford, Ont., has been awarded to the P. H. Secord & Sons Construction Co., Ltd.

Mr. Ewan Cameron, who for fifty years had charge of the G. N. W. Telegraph Company's office, Brantford, Ont., died on May 13th at the age of 82 years. He had been retired on pension four years ago.

Calgary, Alta.

Messrs. Cunningham Electric Co., 8th Avenue, W., Calgary, Alta., have been awarded the contract for electric work on a store building to be erected at 2302 Fourth Avenue W., Calgary.

Cap De La Madeleine, Que.

The ratepayers of Cap De La Madeleine, Que., will vote on or about June 1 on a by-law authorizing the expenditure of \$8,000 for an electric fire alarm system.

Mr. J. B. Badeau, 471 St. Maurice St., Three Rivers, Que., has been awarded the contract for electrical work on a store building being erected at Notre Dame and Rochefort Sts., Cap De La Madeleine.

Charlottetown, P.E.I.

Mr. W. P. Doull, corner Weymouth and Richmond Sts., Charlottetown, P.E.I., has secured the contract for electrical work on a bank building being erected in that place for the Bank of Nova Scotia, at an estimated cost of \$100,000.

Dunnville, Ont.

Messrs. Harris & Marson, 81A Parkway Ave., Toronto, have secured the contract for electrical work on an addition that is being built to the public school in Dunnville, Ont., at an estimated cost of \$40,000.

East Toronto, Ont.

Messrs. Richardson & Cross, 79 King St E., Toronto, have been awarded the contract for electrical work on a public library to be built on Main Street, East Toronto, at an estimated cost of \$35,000.

Edmonton, Alta.

Mr. R. P. Blakey, architect, Parliament Buildings, Edmonton, Alta., desires prices on power house equipment for use in connection with a power house to be built at the Technology and Normal School, Calgary, Alta.

The Hillis Electric Co., Jasper Avenue, Edmonton, Alta., have secured the contract for electrical work on an addition to the hospital at Lamont, Alta., which is to be built at an estimated cost of \$12,000.

East London, Ont.

The contract for the erection of a hydro sub-station, to be erected at East London, Ont., at a cost of \$40,000, has been awarded to Messrs. Hyatt Bros., 288 Egerton St., London, by the London Public Utilities Commission.

Galt, Ont.

The Galt Public Utilities Commission have decided to erect the new utilities building themselves instead of by contract. The Commission, reports state, having gone into the business of selling electrical appliances, it was felt that in order to give service to customers it should also go into the wiring business and an electrician will be employed.

Grande Prairie, Alta.

Mr. C. K. Gordon, Grande Prairie, Alta., has been awarded the contract for electrical work on an addition that is

being built to a hotel in that town owned by Messrs. Roberts & Van Amberg.

Hamilton, Ont.

The Hydro-electric department at Hamilton, Ont., having offered to furnish citizens with an electric stove and water heater, together with the necessary wiring, for the sum of \$200, payable on easy terms, over 500 applications have been received in this connection recently.

Hull, Que.

Mr. Bard, Hull, Que., has been awarded the contract for electrical work on a store and garage recently erected on Main St., for Dr. Ritchie, Hull, Que.

Mr. W. Bard, Hull, Que., has been awarded the contract for electrical work on a store building being erected on St. Joseph Blvd., for Mr. Ernest Rollin, 16 Lois St., Hull.

Kingston, Ont.

It is proposed to establish wireless communication between the city of Kingston, Ont., and the Main Duck Islands in the near future.

Leduc, Alta.

A by-law authorizing the expenditure of \$20,000 for an electric lighting plant at Leduc, Alta., was passed recently by a large majority.

London, Ont.

The Knowles Electric Co., 544 Talbot St., London, Ont., has secured the contract for electrical work on a Children's Hospital that is to be erected on Ottaway Ave., London, at an estimated cost of \$250,000.

Montreal, Que.

The Canada Gazette announces the incorporation of The St. Maurice Power Company, Ltd., with a capital of \$8,000,000. The head office of the company will be at Montreal, Que.

Messrs. J. A. Anderson & Co., 7205 Mansfield St., Montreal, have secured the contract for electrical work on an office building at the corner of St. Sacrament and St. Alexander Sts., which is undergoing alterations at an estimated cost of \$140,000.

North Vancouver, B.C.

Messrs. Mundy, Rowland & Co., Standard Bank Bldg., Vancouver, have been awarded the contract for making a \$20,000 electrical installation in a C. P. R. steamer at North Vancouver, B.C.

Ottawa, Ont.

Mr. Stan Lewis, 63 Metcalfe St., Ottawa, has been awarded the contract for electrical work on a public school that is being erected at Chapel, Fril & York Sts., Ottawa, at an estimated cost of \$500,000.

St. Catharines, Ont.

The St. Catharines city council are contemplating the erection of electric lighting standards on St. Paul St., Burgoyne Bridge to Geneva. Should this work be carried out it is intended that such standards will also carry the wire required for the operation of street cars, eliminating all other poles along the street.

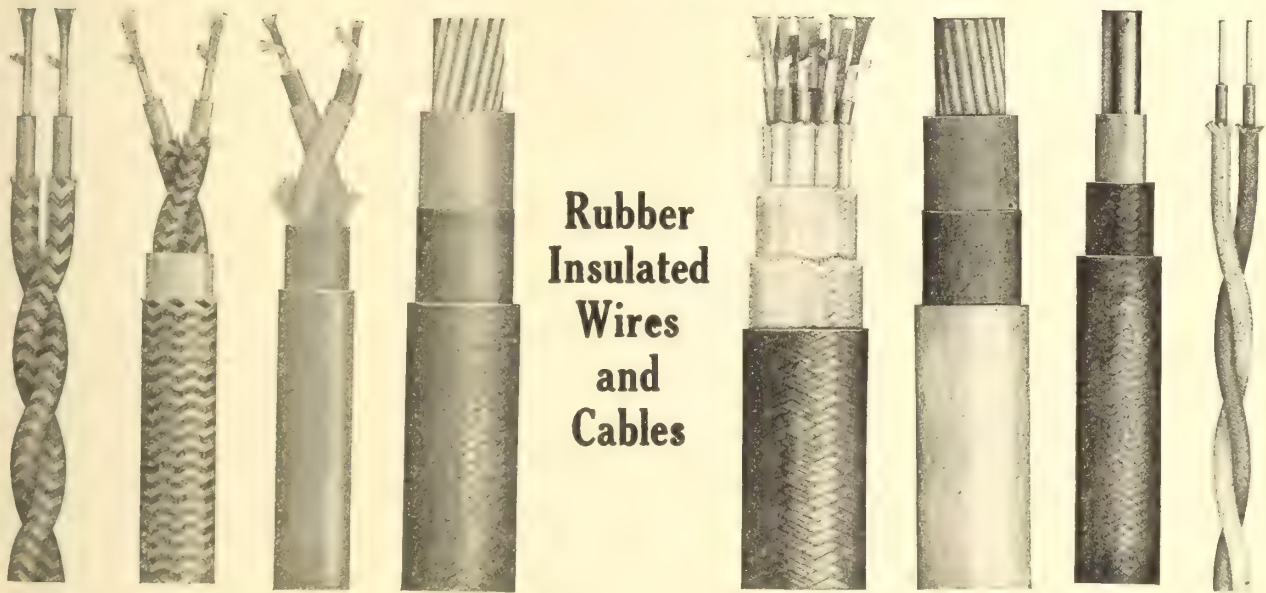
Windsor, Ont.

The Crown Battery Company Service, Detroit, has opened a branch at Dougall and Wyandotte Streets, Windsor. They will deal with electric lighting and starting systems of all makes of cars, and will also assemble batteries. Joseph S. Scott and P. M. Moore are in charge.

WIRES AND CABLES

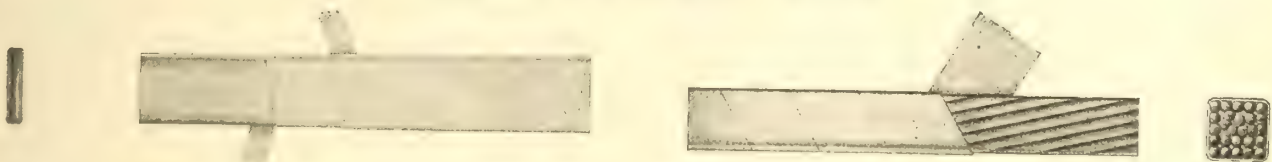
Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889

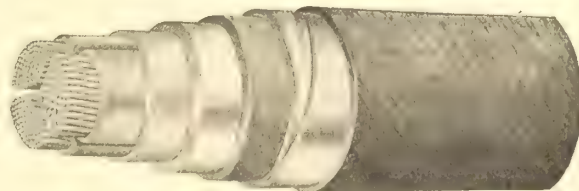


Rubber
Insulated
Wires
and
Cables

Magnet Wires and Cables



Power Cables



Weatherproof Wire
Cadmium-Copper Wire

Telephone Cables

Trolley Wire
Enamelled Wire

Head Office and Factory

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MONTREAL

ELECTRICAL EQUIPMENT EXCHANGE

Used Machinery Sold

Special Equipment Offered

Motors Wanted

WANTED—to buy D.C. Motors from 2 to 10 horsepower. Write Kaufman Rubber Co., Limited, Kitchener. 9-12

Electricians

And Armature Winders—send for book of motor connections, single, 2 and 3 phase. Best book on the market for simple way of connecting. \$1. Walter Clinton, Welland, Ont. 22-11

60 to 25 Cycles

Has your frequency been changed? A small advertisement in this section will sell your old equipment and put you in touch with new machinery. 9-10

Patent For Sale

British Electrical Engineer desires to sell outright the Canadian Patent & Manufacturing rights of Canadian Patent No. 209,477 Cable Socket. The invention enables Cable Sockets to be produced in all sizes and owing to the perfect result obtained, a huge success has already attended the working of the British Patent. For full particulars apply Box 601, Electrical News, Toronto. 11

Hudson River Vehicular Tunnel to be Completed by 1925

The vehicular tunnel between New York City and Jersey City, N.J., under the Hudson River, will be completed by 1925, according to a report of the New York State Bridge and Tunnel Commission. It is pointed out, however, that to achieve this result it will be necessary to have the money available so that the contracts can be let promptly. This tunnel will be the largest vehicular tunnel in the world.

New Steel Mill for Brazil

The Brazilian Official Gazette has published a decree authorizing the Federal Minister of Agriculture, Industry and Commerce of Brazil to enter into a contract with a local company for the construction of a steel mill equipped with electric furnaces. The importation of necessary materials, such as machines, motors, furnaces, etc., will be duty free for a period of 30 years. Permission is granted the company for the use of waterfalls belonging to the federal government.

Maine Contemplates State Water Power Control

A proposed constitutional amendment which would give the State of Maine authority to control and develop water power was submitted to the Legislature recently in a message by Governor Baxter. The amendment will provide also for the taxation of all water powers and water power fees and hydro-electric energy generated therefrom. The Governor stated that by the terms of the Federal Water Power Bill the water powers of Maine are in danger of passing under Federal control and it well may be that the only method of preventing this is to levy a tax upon hydro-electric energy generated within the state

Advertisements under "Situation Wanted" or "Situation Vacant" are charged at two cents a word per insertion, minimum charge 50 cents.

Advertisements for tenders, equipment, wanted or for sale, etc., or miscellaneous, are charged at \$2.80 per inch. For four or more consecutive insertions of the same advertisement a discount of 25% is given.

All advertisements must be in the publisher's hands by the 10th or 23rd of the month to insure insertion in the subsequent issue.

TECHNICAL EMPLOYMENT Positions Desired and Vacant

WANTED—A first-class electrical salesman for the Province of Quebec. A man who can handle office as well as road work. Box 599, Electrical News, Toronto. 11

Power House and Sub Station Operator desires position, available at once. Please give location and salary, replies confidential. Box 602, Electrical News, Toronto. 11-12

POSITION WANTED—Electrical engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 600, Electrical News, Toronto. 11

and shipped beyond its borders. The Governor further stated that the constitutional amendment proposed would give the people an opportunity to decide for themselves whether the state should control and develop water power storage basins and undeveloped water powers.

New Bridge for Buenos Aires

A bridge to cost 1,500,000 pesos is to be constructed over the Riachuelo from Calle Vieytes, Buenos Aires, to Avellaneda. There is a heavy traffic to and from Avellaneda at this point, and the government has been urged to expedite the project for the new bridge. The construction work will be under the management of the Director of Roads and Bridges.

Large Pittsburgh Building Moved

The widening of Second Avenue at Pittsburgh, made necessary the moving of an eight-story building a distance of 40 feet. The building was a brick and steel structure about 30 x 120 ft. and was loaded with hardware. It was necessary to move it without any disturbance to business. The usual business proceeded during the entire operation.

The weight of the structure was more than 5,000 tons and it was necessary to use 880 screw jacks to lift it. It was lifted 16 in. together with the sidewalks at the front and side and slid over by means of ten screw jacks moving at the rate of 1 ft. an hour on steel rollers operating on rails. This work was let to the John Eichelay, Jr., Co. of Pittsburgh, and was done at a saving to the city of over \$100,000.

Something Unusual

If you require a motor, dynamo, transformer or any electrical machinery of unusual capacity, dimensions, frequency or voltage, insert a small advertisement in these pages. You will reach the electrical trade of Canada and someone is sure to have what you require. 15-16

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	750	Wagner
"	1	75	3	25	550	480	Wag.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	25	550	750	Wag.
Used	2	30	3	25	550	720	Wag.
New	2	35	3	25	550	720	Wag.
Used	1	30	3	25	550	1500	Int. & Hm.
"	2	30	3	25	550	500	F.-M.
Used	1	25	3	25	550	750	C. G. E.
New	1	25	3	25	550	750	Wag.
New	1	15	3	25	550	1450	Wag.
"	1	15	3	25	550	750	Lanc.
"	1	15	3	25	550	720	Wag.
New	2	13	3	25	550	750	Lanc.
Used	1	7 1/2	3	25	220	1500	Int. & Hm.
"	1	7 1/2	3	25	550	1450	C. G. E.
New	1	7 1/2	3	25	550	750	Wag.
Used	1	7 1/2	3	25	550	700	Lanc.
New	1	5	3	25	550	1440	Excelsior
Used	1	5	3	25	550	1120	Wag.
New	3	3	3	25	550	1500	Lanc.
"	4	3	3	25	550	1400	Excelsior
Used	1	2	1	60	110	1750	Wag.
New	2	2	3	25	550	1500	Excelsior
New	2	2	3	25	550	1400	Excelsior
"	2	2	3	25	550	1425	Wag.
New	1	1	3	25	110	1400	Wag.
"	1	1 1/2	1	25	110	1420	Wag.
New	1	1	3	25	140	1750	Wag.
Used	1	1	3	25	220	1500	Tor. & Hm.
Used	1	1	1	25	110	1400	Wag.
New	1	1	1	25	110	1440	Wag.
"	1	1	3	25	550	1425	Lanc.
Used	1	1	3	25	220	750	Wag.

Write for Prices

H. W. PETRIE, Limited

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If You Want to Know

What the Building Reports Ltd. can do for you, write for full information. The Building Reports Ltd. is a company that has been established for the purpose of providing the public with the latest and most reliable information regarding the construction of buildings and the cost of building. The company has a large staff of experienced engineers and architects who are able to provide the public with the latest and most reliable information regarding the construction of buildings and the cost of building.

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345 Adelaide St. West, Toronto
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119 Board of Trade Bldg. - MONTREAL
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Machines in Our Montreal Stock



3 Phase, 60 Cycle, 2200 Volt

2	800	H.P.	450	RPM.	Slip Ring
1	300	H.P.	300	RPM.	Slip Ring
2	300	H.P.	450	RPM.	
1	100	H.P.	600	RPM.	
1	75	H.P.	1200	RPM.	

3 Phase, 60 Cycle, 550 Volt

2	200	H.P.	600	RPM.	Slip Ring
1	100	H.P.	600	RPM.	
2	75	H.P.	900	RPM.	
1	50	H.P.	900	RPM.	Slip Ring
2	50	H.P.	900	RPM.	
2	35	H.P.	900	RPM.	
1	35	H.P.	600	RPM.	
3	30	H.P.	1200	RPM.	
2	30	H.P.	900	RPM.	
1	25	H.P.	1140	RPM.	
1	20	H.P.	900	RPM.	
2	15	H.P.	900	RPM.	
3	10	H.P.	1200	RPM.	
2	10	H.P.	720	RPM.	
1	10	H.P.	1800	RPM.	
1	8	H.P.	810	RPM.	Cranes
1	7½	H.P.	900	RPM.	
6	7½	H.P.	1200	RPM.	
1	7½	H.P.	1800	RPM.	
1	5	H.P.	1200	RPM.	
11	5	H.P.	1800	RPM.	

3 Phase, 60 Cycle, 550 Volt

1	1	H.P.	1140	RPM.
15	3	H.P.	1800	RPM.
5	3	H.P.	1200	RPM.
5	2	H.P.	1800	RPM.
8	2	H.P.	1200	RPM.

3 Phase, 60 Cycle, 220 Volt

2	75	H.P.	900	RPM.
1	60	H.P.	900	RPM.
2	50	H.P.	900	RPM.
1	30	H.P.	1200	RPM.
1	12½	H.P.	1800	RPM.
1	10	H.P.	1800	RPM.
2	5	H.P.	900	RPM.
5	5	H.P.	1200	RPM.
1	2	H.P.	900	RPM.
1	2	H.P.	1200	RPM.
1	1	H.P.	1200	RPM.
1	½	H.P.	1800	RPM.

Single Phase, 60 Cycle, 110 Volt

1	7½	H.P.	1800	RPM.
4	5	H.P.	1800	RPM.
10	3	H.P.	1800	RPM.
10	2	H.P.	1800	RPM.
17	1½	H.P.	1800	RPM.
13	1½	H.P.	1800	RPM.
19	1½	H.P.	1800	RPM.
18	1½	H.P.	1800	RPM.

Single Phase, 60 Cycle, 110 Volt

2	1	6	H.P.	1200	RPM.
6	1	8	H.P.	1800	RPM.
1	1	8	H.P.	1200	RPM.

Single Phase, 25 Cycle 110/220 Volt

1	1	8	H.P.	1415	RPM.
2	1	6	H.P.	1750	RPM.
4	1	6	H.P.	1425	RPM.
1	1	2	H.P.	1420	RPM.

D.C. Motors and Generators

1— 40	H.P.	220	Volts
1— 35	H.P.	220	Volts
1— 17	H.P.	110	Volts
1— 8½	H.P.	125	Volts
1— 8	H.P.	120	Volts
1— 1/4	H.P.	220	Volts
2— 1/6	H.P.	32	Volts

Transformers

1	40	K.V.A.	2200/110	Volts
1	30	K.V.A.	2200/110	Volts
2	25	K.V.A.	2200/550	Volts
2	15	K.V.A.	2200/550	Volts
5	10	K.V.A.	2200/550	Volts
2	7½	K.V.A.	2200/550	Volts
3	5	K.V.A.	2200/550	Volts
1	3	K.V.A.	2200/550	Volts

Wire, 'phone or write us for further particulars.

ELECTRIC MOTOR & MACHINERY CO., LIMITED

64 Wellington St. W., TORONTO, ONT.

417 St. James St., MONTREAL, QUE.

Motors in Stock

25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND	
1	25 hp. C.G.E. 750 rev., starter, rails, pulley.
1	10 hp. T.H.E. 1500 rev., starter, rails, pulley.
1	10 hp. C.W. 750 rev., starter, rails, pulley.
1	5 hp. C.W. 1500 rev., starter, rails, pulley.
25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND	
1	25 hp. Ball bearing 750 rev., starter, rails, pulley.
1	13 hp. Lancash. 750 rev., starter, rails, pulley.
1	7½ hp. Fairbanks 750 rev., starter, rails, pulley.
60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND	
1	20 hp. T.H.E. 1200 rev., pulley rails starter.
1	20 hp. Westgh. 1200 rev., pulley, rails, starter.
2	10 hp. Westgh. 1200 rev., pulley, rails, starter.
1	7½ hp. Westgh. 1200 rev., pulley, rails, starter.
1	7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
1	7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND	
1	7½ hp. All Chal. 1200 rev., pulley rails, starter.
1	15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND	
3	¾ hp. 1200 rev. clutch type T.H.E.
1	1 hp. 1800 rev. split phase Peerless.
NEW SINGLE PHASE MOTORS IN STOCK—REPULSION	
2	3 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
2	3 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
3	1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
3	1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
7	¾ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
6	¾ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
1	1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
1	1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
4	¾ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
SPLIT PHASE	
2	1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
2	¾ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4	¾ hp. Menominee 110 volt, 60 cycle, 1800 rev.
4	¾ hp. Ohio 110 volt, 60 cycle, 1800 rev.
4	¾ hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited
HAMILTON ONTARIO

For Value

5	1/6 H.P. 1 phase, 60 cycle, 1750 RPM. 110 volts, new each	30.00
1	1/6 H.P. 110 volts, Universal motor	30.00
12	1/4 H.P. General Electric, 1 phase, 60 cycle, 110 v. new, each	55.00
1	1/2 H.P. 3 phase, 110 volts, 25 cycle, 1450 R.P.M.	50.00
3	1/2 H.P. Century, 25 cycle, 1460 RPM. 1 phase, 110 volts, new, each	105.00
4	1/2 H.P. Emerson D.C. motors, 220 volts, 1200 RPM. new, each	50.00
1	7/8 H.P. 60 cycle, 1200 RPM. 3 phase, 220 v., complete, new	300.00
1	10 H.P. 60 cycle, 1800 RPM. 220 v., complete	210.00
1	5 KW. Westinghouse generator, 1400 RPM. nearly new, 125 volts	175.00
6	10 H.P. Westinghouse, 3 phase, 25 cycle, 710 RPM. 550 v., base and starter, each	350.00
5	7½ H.P. Westinghouse, 3 phase, 25 cycle, 710 RPM. 550 volt, base and starter, each	290.00
1	50 H.P. 3 phase, 60 cycle, 1800 RPM. 220 volts, or 550 volts, base and starter	700.00
1	35 H.P. 220 volts, 3 phase, 60 cycle, 1200 RPM. with starter	650.00
1	25 H.P. 3 phase, 220 volts, 25 cycle, 750 RPM. Crocker-Wheeler with steel base and pulleys and starter, almost new	625.00
1	35 H.P. Westgh. 3 phase, 25 cycle, 710 RPM., 550 volts, base and starter	650.00
1	30 H.P. 3 phase, 25 cycle, 710 RPM., Can. Gen. Elec., 550 volts, base and starter	590.00
1	100 H.P. 3 phase, 25 cycle, 550 volts, 480 RPM. Westinghouse with starter, new	2250.00
1	50 H.P. 3 phase, 25 cycle, 550 volts, 500 RPM., shipping motor, new	1100.00
1	3 H.P. 1 phase, 25 cycle, 110/220 volts, Century, 720 RPM., new	280.00

We also have oil and gasoline engines of all sizes.
We have some new 1, 2, 3 and 5 H.P. Westinghouse motors, never mounted, at shipping prices.

Industrial Engineering Company of Canada, Limited
Consulting Engineers—Electrical Equipment

R. G. Lee, General Manager

TORONTO
28 Wellington St. W.

WINDSOR
Royal Bank Building

Province of Quebec Number

THE Province of Quebec, electrically, occupies a somewhat unique position among the provinces of the Dominion. Possessing numerous water powers second only to Niagara, the work of developing and distributing the electrical energy has been undertaken almost entirely by private capital.

The history of these important developments, the carefully-devised plans for marketing the power, and the influence of electric power on the industrial growth of the province, constitute a story of unusual interest and significance. The publishers of the "Electrical News" will issue next month a

Special Quebec Number

in which will be presented illustrations, facts and figures designed to give the reader a unified conception of what the electric power enterprises mean to the province and of the possibilities of future development.

This number will be a compendium of information about the electrical developments of the province. It will be issued simultaneously with the annual convention of the Canadian Electrical Association to be held in the City of Quebec, and will offer a merchandising opportunity of exceptional merit.

Advertisers are requested to make early reservations of space in order that the publishers may be able to maintain the high standard of service which invariably means mutual satisfaction.



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News
Engineering Contracting Merchandising Transportation

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PANELBOARDS, LIN-
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Lamp Shades provides the
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ray of beautiful designs.

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Montreal

**We have available for immediate ship-
ment approximately 250 motors, mostly
3 phase, 25 cycle, 220 and 550 volt.**

The following are a few of the bargains. We
have many others equally attractive:—

Single Phase, 25 Cycle, 110 Volt.		
4	1/8 H.P. Menominee, 1400 RPM., new, each	\$ 32.50
2	1/4 H.P. St. Louis, 1400 RPM., new, each	40.00
3 Phase, 25 Cycle, 220 Volt.		
6	2 H.P. Crocker-Wheeler, 1500 RPM., new, each..	170.00
4	3 H.P. Crocker-Wheeler, 1450 RPM., new, each..	200.00
3	5 H.P. Crocker-Wheeler, 1450 RPM., new, each..	255.00
2	5 H.P. Robbins-Meyers, 1450 RPM., used, each..	185.00
6	7 1/2 H.P. Crocker-Wheeler, 1450 RPM., new, each..	420.00
1	7 1/2 H.P. Westinghouse, 1450 RPM., new, each...	420.00
2	15 H.P. Crocker-Wheeler, 725 RPM., new, each..	625.00
All above 3 phase motors have base and pulley. 7 1/2 H.P. and up have approved starters.		
3 Phase, 25 Cycle, 550 Volt Motors without pulley, base or starter.		
43	1 H.P. Westinghouse, 1400 RPM., new, each....	135.00
10	10 H.P. Westinghouse, 1400 RPM., new, each....	290.00
30	15 H.P. Westinghouse, 1400 RPM., new, each....	300.00
3 Phase, 25 Cycle, 550 Volt, with base, pulley and starter.		
3	7 1/2 H.P. General Electric, 1500 RPM., used, each..	385.00
3	10 H.P. General Electric, 1500 RPM., used, each..	415.00
1	15 H.P. General Electric, 750 RPM., used, each..	500.00
1	30 H.P. General Electric, 750 RPM., used, each..	575.00
2	40 H.P. General Electric, 750 RPM., used, each..	925.00
1	50 H.P. Westinghouse, 750 RPM., new, each..	975.00
1	75 H.P. General Electric, 750 RPM., used, each..	1275.00
1	100 H.P. General Electric, 750 RPM., used, each..	1850.00
Miscellaneous Apparatus		
1	Wagon Battery Charger, 25 Cycle, 220 Volt, 250 Amps, for 2 moving picture machines	800.00
1	Motor Generator Battery Charging Set, 110 V., 25 cycle, A.C., 10 A., 30 V., D.C.	225.00

McNaughton-McKay Electric Co.
LIMITED

Telephone 4241

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SAFETY FROST

Non-injurious to the skin, non-inflammable and
absolutely permanent.

Easy to apply—Simply dip into can and allow
excess to drip back for two minutes, and wash off
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Is not affected by weather or heat of lamp. It is
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Carried in Stock by

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**HUSTLING DEALERS MAKE GOOD PROFITS HAND-
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Should the battery prove defective, simply satisfy the merchant from whom purchased. He is authorized to replace it.

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Miners of finest Amber Electrical mica
Large stock of all grades always on hand

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The Superior Luminous Pendant

"Most Attractive in Daylight—
Most Brilliant at Night"

This article contains an actual quantity of real radium; is unbreakable and is guaranteed to retain its original luminosity for five years.

Send now for your supply. They will sell!
Splendid display features and liberal discounts!

Prices: To the dealer, \$1.80 per dozen, mounted on attractive display card. \$21.00 per gross. Checks payable in American funds. Cash with order 3% off.

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FOR SALE

2—100 K.V.A. Transformers, Crocker-Wheeler, Single Phase, 12000/480 Volts, 60 Cycle with thermometer and oil gauges. New—Never used.

1—5 K.V.A. Transformer, Crocker-Wheeler, 440/110 Volt, Single Phase. Type A.D.

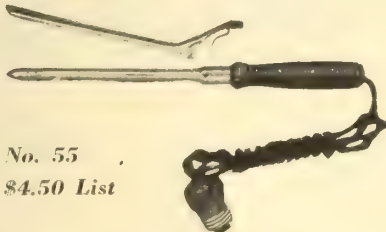
1—5 H.P., 440 Volt, 3 Phase, 60 Cycle, 1200 R.P.M., Crocker-Wheeler Induction Motor. New. B & R 6 x 4 pulley.

1—No. 62½ Electric Mine Hoist, English Iron Works, Single friction drive. Rope pull capacity 2500 pounds, 1800 ft. 5/8" rope. Direct connected to 22 H.P. Slip Ring Motor, 440 volt, 3 phase, 60 cycle.

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\$4.50 List

Combination Curling Iron and Waver Rod is a good iron. Your customers will want it. Guaranteed for one year.

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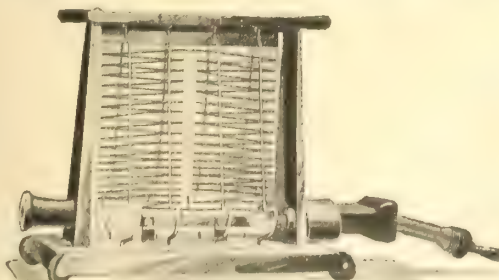
A National Weekly for the
Construction Interests of Canada

Established 1885

Published Every Wednesday

\$3.00 a Year

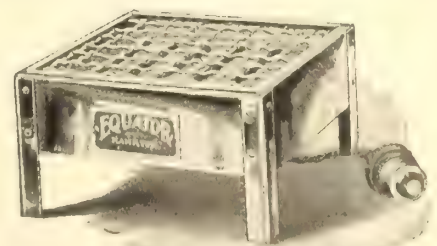
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These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

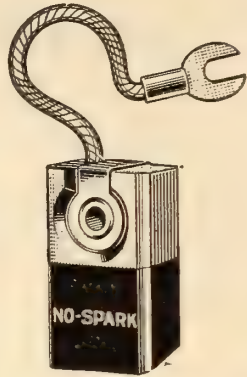
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Wagner Motor Driving Polishing Wheels.

and you want it to be as high in quality as the machine, specify

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Wagner motors will help to sell your machine and make them dependable.

Send for Bulletins 11813 and 12213.

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The Peirce Wireholder



No. 394

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STEEL Switch Block

better than wood
Fits Flush, saves time
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No More Broken Blocks

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Our turbines have stood the test of time. Why not investigate our proposition before making a decision on the purchase of power equipment?

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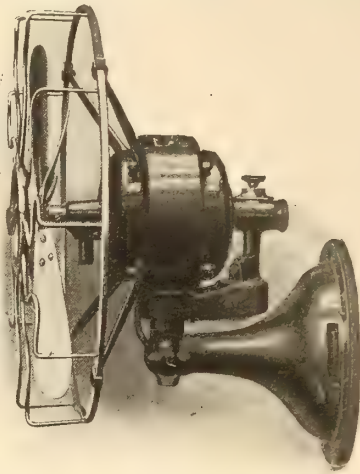


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Send for our Bulletin No. 54

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PETERBORO, - ONT.

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Our proposition on Westinghouse Fans with shipment on or before June 1st.

Will save you money.

Write for it to-day.

The secret of good fan business is to stock up early.

The Masco Company, Ltd.

Jobbers of Standard Electrical Merchandise.

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"Pittsburgh" Show Window Reflectors

ARE A LIGHTING ECONOMY

They redirect the light to give the fullest illumination on the window trim, thereby eliminating waste distribution.

These reflectors promote lighting efficiency and economy. Their first cost is nominal, yet their saving in light is very considerable. Send for further information to-day.



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PITTSBURGH, PA.

Canadian Distributors

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Toronto

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Cut Machinery Costs

A big item in the real cost of any machine is the cost of power to operate it day in and day out.

This item can be cut to its lowest point right in the beginning by purchasing a machine with the electric motor attached—a Lincoln Electric Motor—scientifically fitted to its job by Lincoln Engineers.

Here are actual examples of the savings made by Canadian and U. S. machinery firms who are using Lincoln Motors.

Example No. 1—

A manufacturer of a small electric hoist now gets 25% greater capacity on the same machine with no changes whatever in design—simply by installing Lincoln Motors of the size and type recommended by Lincoln Engineers.

Example No. 2—

The leader in another line of hoisting machinery has adopted a Lincoln plan for simplifying both the electric motor and its control on his machines so that his customers get better results at less than half the former cost.

Example No. 3—

The largest manufacturer of a certain type of metal working machine is now using a 20 h.p. Lincoln Motor where he formerly used a 25 h.p. of another make. Further, his customers are paying about 50% less in power bills for the running of their machines.

We are giving this same kind of service in Canada direct to motor users and motor driven machinery manufacturers.

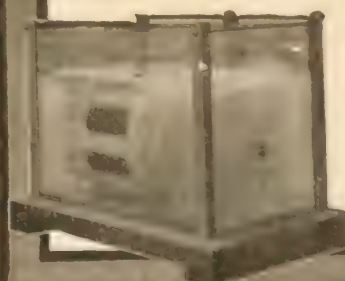
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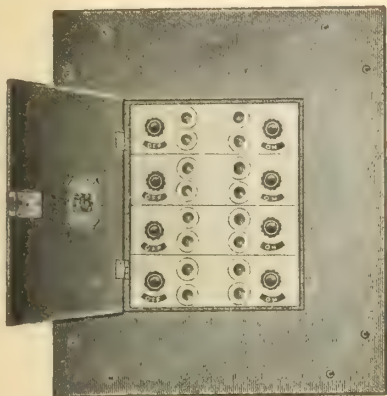
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Montreal Office
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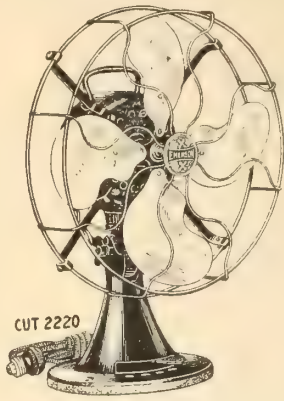
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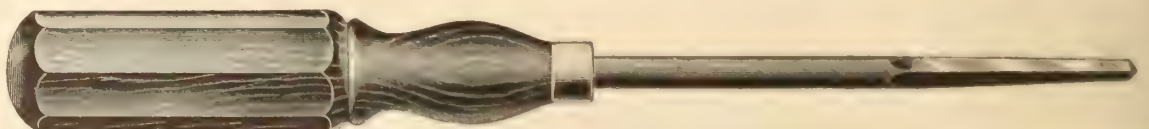
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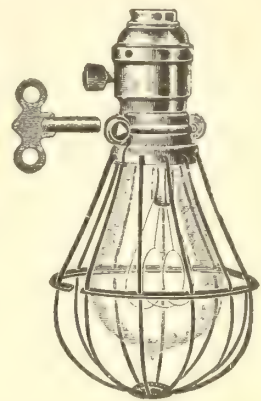
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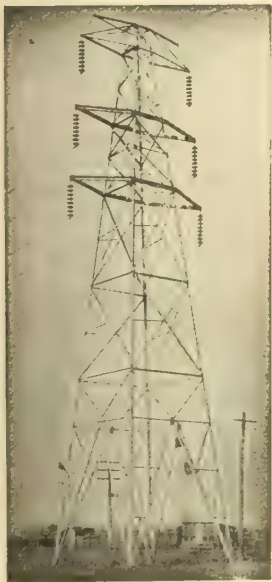


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Wilson-McGovern Limited**GLASSWARE**Consolidated Lamp & Glass Company
Jefferson Glass Company**GROUNDING BOXES**

Electrical Development & Machine Co.

GUARDS (Lamp)International Machinery & Supply Co.
McGill Manufacturing Company**HANGERS (Cable)**

Standard Underground Cable Company of Canada, Limited

HEAD GATE HOISTSHamilton Company, Wm.
Smith Company, S. Morgan**HEATING DEVICES**Canadian Westinghouse Company
Clemens Electrical Corp. of Canada, Ltd.
Hatheway & Knott, Inc.
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company
Spielman Agencies, Registered**HIGH TENSION EQUIPMENT**

Delta Star Electric Company

HYDRAULIC MACHINERY

Boving Hydraulic & Engineering Company

HYDRO EXTRACTORS

Jones & Glasco

ILLUMINATING GLASSWARE

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Canadian Inspection and Testing Laboratories**INSULATING VARNISHES AND MOULDING COMPOUNDS**Canadian Johns-Manville Company
Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
Spielman Agencies, Registered**INSTRUMENTS**Canadian Westinghouse Company
Hatheway & Knott, Inc.
Northern Electric Company
Sangamo Electric Company of Canada, Ltd.**INSTRUMENT CUTOUT SWITCHES**

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Northern Electric Company

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Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
International Machinery & Supply Co.**INSULATION (Hard Fibre)**

Diamond State Fibre Co. of Canada, Ltd.

INSULATORSCanadian Porcelain Company
Canadian Westinghouse Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Moloney Electric Company of Canada
Mica Company of Canada
Northern Electric Company
Ohio Brass Company**INSULATING CLOTH**

Packard Electric Company

INSULATING VARNISHES

Canadian Johns-Manville Co.

IRONS (Electric)Canadian Westinghouse Company
Clemens Electrical Corp. of Canada, Ltd.
National Electric Heating Company
Northern Electric Company**IRONING MACHINES**

Meyer Bros.

LAMP BULBS (Electrical)

Jefferson Glass Company

LAMP SHADES—SILK

Manufacturers Trading & Holding Co.

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Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto
Northern Electric Company**LANTERNS (Electric)**Canadian National Carbon Company
Duncan Electrical Company
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Northern Electric Company**LIGHTING PLANTS**

Dominion Steel Products

LIGHT-REGULATORS

Dominion Battery Company

LINE MATERIALCanadian Johns-Manville Co.
Electric Service Supplies Company
Northern Electric Company
Ohio Brass Company
Slater, N.
Steel Company of Canada, Limited
Steel City Electric Company**LIGHTING STANDARDS**Dominion Steel Products
Northern Electric Company**LOCK AERIAL RINGS**

Slater, N.

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Canadian Westinghouse Company

MARBLE

Davis Slate & Mfg. Company

MEASURING INSTRUMENTSLeeds Northrup Company
Northern Electric Company**METAL SPINNING**Booth-Coulter Copper & Brass Company
Edmunds & Co., J. H.**METERS**Canadian National Carbon Company
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lincoln Electric Company
Northern Electric Company
Packard Electric Company
Sangamo Electric Company of Canada, Ltd.**MICA**Fillion, S. O.
Kent Brothers
Mica Company of Canada**MOTORS**Canadian Crocker-Wheeler Company
Canadian National Carbon Company
Canadian Westinghouse Company
Century Electric Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lancashire Dynamo & Motor Company
Lincoln Meter Company
MacGovern & Company
Marchand Electrical Works
McNaughton-McKay Electric Co.
Northern Electric Company
Petrie, Limited, H. W.
Robbins & Myers
Thomson Company, Limited, Fred.
Toronto & Hamilton Electric Company
Wagner Electric Mfg. Company of Canada
Wilson-McGovern Limited**MOTOR AND GENERATOR BRUSHES**Calebaugh Self-Lubricating Carbon Co.
Dominion Carbon Brush Company**MOTOR STARTING SWITCHES**

Canadian Drill & Electric Box Company

OUTDOOR SUB-STATIONS

Moloney Electric Company of Canada

OVERHEAD MATERIALNorthern Electric Company
Ohio Brass Company**PANEL BOARDS**Benjamin Electric Manufacturing Company
Canadian General Electric Company
Canadian Krantz Manufacturing Company
Devoe Electric Switch Company
Northern Electric Company**PAINTS & COMPOUNDS**G. & W. Electric Specialty Company
McGill Manufacturing Company
Spielman Agencies, Registered
Standard Underground Cable Co. of Canada**PHOTOMETRICAL TESTING**

Electric Testing Laboratories, Inc.

PATENT SOLICITORS & ATTORNEYSDennison, H. J. S.
Fetherstonhaugh & Hammond
Ridout & Maybee**PINS (Insulator and High Voltage)**Ohio Brass Company
Slater, N.**PIPE LINES**Boving Hydraulic & Engineering Company
Hamilton Company, Wm.**PLUGS**Benjamin Electric Manufacturing Company
Hatheway & Knott, Inc.**POLES**Lindsley Brothers Company
Northern Electric Company**POLE LINE HARDWARE**Canadian Johns-Manville Co.
Northern Electric Company
Slater, N.
Steel Company of Canada, Limited**PORCELAIN**Canadian Porcelain Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Ohio Brass Company**PORCELAIN BUSHINGS**

Electrical Development & Machine Co.

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Electrical Development & Machine Co.

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Northern Electric Company
Standard Underground Cable Company of Canada, Limited**POWER PLANT EQUIPMENT**Boving Hydraulic & Engineering Company
Electric Motor & Machinery Co., Ltd.
MacGovern & Company
Wilson-McGovern Limited**PUMPS AND PUMPING MACHINERY**Boving & Company of Canada
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Monarch Electric Company
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Paulding, John I.**RECORDING INSTRUMENTS**

Canadian Westinghouse Company

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Pittsburgh Reflector & Illuminating Co.**REMOTE CONTROL SWITCHES**

Electrical Maintenance & Repairs Company

REPAIRSElectrical Maintenance & Repairs Company
Electric Motor & Machinery Co., Ltd.
Marchand Electric Works
Thomson Company, Fred**REVERSE PHASE RELAYS**

Electrical Development & Machine Co.

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Canadian Drill & Electric Box Company

ROSETTESBenjamin Electric Manufacturing Company
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Hydeville Slate Works**SOCKETS**Benjamin Electric Manufacturing Company
Duncan Electrical Company
McDonald & Willson, Ltd., Toronto
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Northern Electric Company

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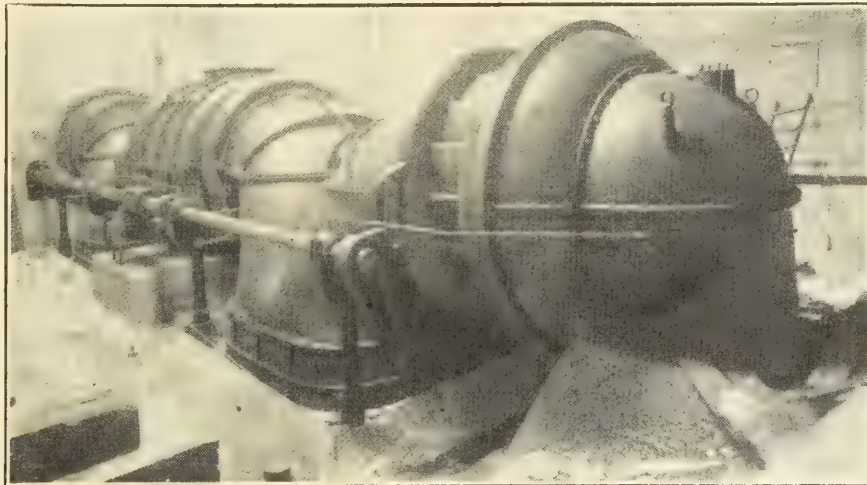
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Made in Canada

**Water
Turbines**

**Hydraulic
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**Turbo
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**High
Efficiency**

**Substantial
Construction**

**Continuous
Service**

The Largest Water Wheel Manufactured in Canada

BOVING HYDRAULIC & ENGINEERING CO., LIMITED
LINDSAY - ONTARIO

International

Just What You've All Been Waiting For!

**The
Electrical Pathfinder**

Just the thing for Bed
Rooms, Hospitals,
Hotels, Passages, in fact
any place where you
want to be sure of get-



**The
Luminous Acorn**

ting light, when you
want it. It twinkles
like a little star in the
dark and you can't miss
it.

It's easy to put on your Pull Chain Socket and Receptacles and,
Oh Boy, what a convenience, when you want to go down into
your cellar in a hurry and get—Coal. Eh, What!

INTERNATIONAL MACHINERY & SUPPLY CO., LTD.

421 St. James Street The Electrical House MONTREAL, Que.

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Paulding, John I.

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Ohio Brass Company

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Northern Aluminum Company

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BAKELITE DILECTO

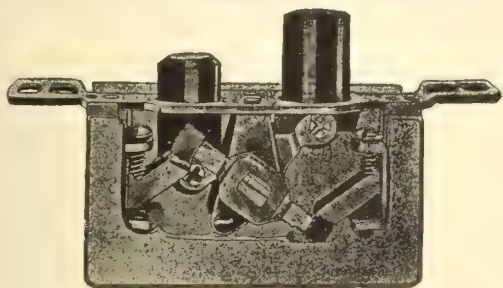
In the Big Electrical Shops

Bakelite-Dilecto, the perfect insulation, is extensively used by large manufacturers of electrical equipment and its extreme physical properties also permit its use in mechanical applications. We manufacture Bakelite-Dilecto, Vulcanized Fibre and Continental Bakelite in sheets, rods, tubes and special shapes and Conite in sheets or rolls from .005" to .020" thick.

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THE New England Push Switch



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If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

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Phone Ad. 106

JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.



Laying Standard Steel-Tape-Armored Cable across a Street

A 50 Per Cent. Saving

in the cost of installing underground electric cables is worth considering these days. A cable which can be laid directly in a trench in the ground without conduits may solve the installation problem before you.

STANDARD Steel-Tape-Armored Cables

are designed for this class of service, and have in many cases shown a 50 per cent. saving in installation cost as compared with single runs of lead-covered cables laid in conduits. Write for bulletin 680, which gives complete information.

Standard Underground Cable Co. of Canada, Limited
Hamilton, Ont.

Montreal

Hamilton

Winnipeg

Seattle

Can You Afford?

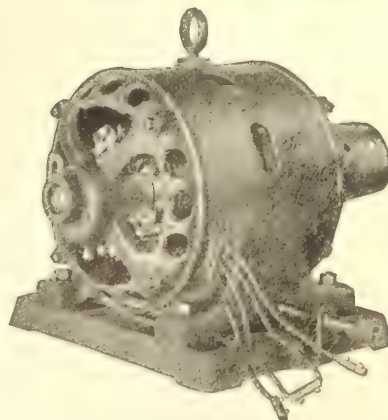
to have your wiremen use a ladder and a brace and bit to bore tube holes in joists when they can do it in one quarter of the time with a Kyle boring machine? Boring holes is the hardest part of house wiring until you use a Kyle—then it is the easiest. If you don't use a Kyle you can't meet the competition of the man who does. It will last a lifetime.



BE FIRST

Canadian Hykon Company
55 John St. South - Hamilton, Ont.

Century Repulsion Start Induction Single Phase Motors



1/10 to 40 Horse Power
Ratings

The oil well is so constructed that any sediment which may collect in it will settle to such a position that it will not be disturbed by the oil rings revolving.

The bearings are constructed of the very best quality of phosphor bronze and provided with machine cut oil grooves to insure an even distribution of oil. They are self oiling, the oil being carried from the oil well up over the shaft by a jointless brass ring, which is of such dimensions as to insure a copious supply of oil at all times the motor is in motion.

Century Electric Company

19th, Pine to Olive Sts.

ST. LOUIS, Mo., U.S.A.

Stock carried in Canada by:
Jones & Moore Electric Co., Ltd., 294 Adelaide St. W., Toronto
Great West Electric Co., Ltd., Winnipeg
Rudel-Belnap Machinery Co., Ltd., Can. Express Bldg.,
McGill Street, Montreal
Rankin & Cherrill, 55 Hastings St. W., Vancouver, B.C.

Westinghouse

Type "H" Bus Bar Supports



This line has been developed to meet the growing demand for a superior bus bar insulator, and is the result of years of practical experience with various methods of assembly. The system of tapped steel inserts in special cement was adopted on account of its marked superiority to all clamped or babbitted assemblies, under the most extreme service conditions of vibration, strain, shock, and expansion due to temperature changes.

THE UNITS are of best grade wet process porcelain with highly glazed brown or white finish.

TAPPED STEEL INSERTS are cemented in each end of the porcelain unit by means of jigs, ensuring perfect alignment.

THE TOP AND BOTTOM FITTINGS are of malleable iron, or bronze, and have threaded studs to fit the tapped inserts mentioned above.

CUP WASHERS are interposed between the porcelain and the top or bottom fittings, in order that adjustments may be made without loosening fittings.

ACCURATE MACHINING of all clamp and bearing surfaces assures perfect contact and assembly.

THE MECHANICAL STRENGTH is very large both on bending moment and in tension.

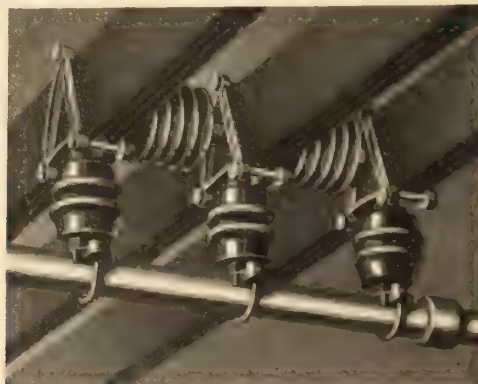
FLASHOVER varies from 3 to 10 times normal rating according to size. Owing to the elimination of clamped fittings on the porcelain, maximum creepage and striking distances are obtained.

INTERCHANGEABILITY. All fittings are absolutely interchangeable, and designed to render assembly and installation as simple as possible. These units are identical with those employed in type "H" Disconnecting Switches, Choke Coils, etc., thus simplifying maintenance problems and making layout uniform.

WIDE VARIETY of combinations to meet all service conditions.

MADE IN CANADA

IMMEDIATE SHIPMENT FROM STOCK



Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg. MONTREAL, 285 Beaver Hall Hill. OTTAWA, Ahearn & Soper, Ltd.
 HALIFAX, 105 Hollis St. FT. WILLIAM, Cuthbertson Block. WINNIPEG, 158 Portage Ave. E.
 CALGARY, Canada Life Bldg. VANCOUVER, Bank of Ottawa Bldg. EDMONTON, 211 McLeod Bldg.



A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

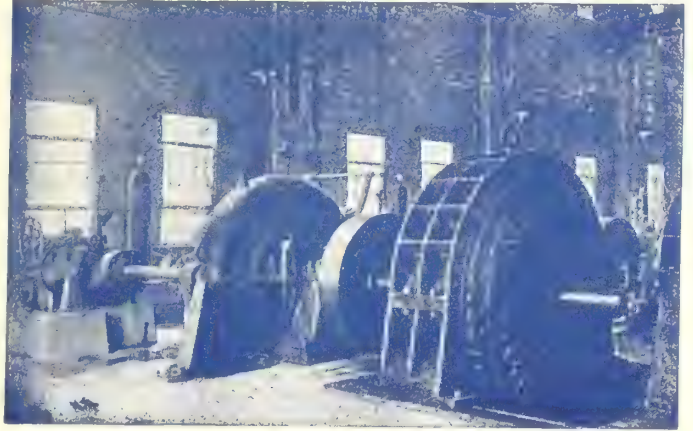
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

Thermo-Electric Water Heating Device

Central Stations:

Are you aware that power supply bases and municipalities after exhaustive tests have adopted this device as standard? Have you ever taken up with us the excellent summer load factor of our heaters in continuous operation on your system?

Their exceptional efficiency, low power consumption and proven durability, create a condition worthy of your earnest and immediate consideration.

Our heaters cover a range from the lighting circuit device to the instantaneous heater which operates on the turn of the tap. Let us have your Water Heating problems whether domestic or industrial.

Canadian Electrical Products Company
Brantford - Canada

USED ELECTRIC MOTORS

IN STOCK APRIL 24th

550 Volts 3 Phase 60 Cycle			
1 H.P.	1800 RPM.	Westg.	
3 "	1800 "	C.-Wheeler	
5 "	1800 "	A.C.B.	
5 "	1200 "	C.G.E.	
5 "	900 "	C.-Wheeler	
7 1/2 "	1800 "	Thomson	
7 1/2 "	1800 "	C.-Wheeler	
7 1/2 "	1200 "	Thomson	
7 1/2 "	1200 "	Ampere	
7 1/2 "	900 "	Westg.	
10 "	1800 "	C.G.E.	
10 "	900 "	C.-Wheeler	
15 "	1200 "	C.G.E.	

ALTERNATING CURRENT			
15 "	1200 "	A.C.B.	
20 "	1200 "	A.C.B.	
20 "	1200 "	C.-Wheeler	
25 "	1200 "	Westg.	
25 "	900 "	C.G.E.	
30 "	900 "	Farbanks	

550 Volts 3 Phase 60 Cycles			
35 H.P.	900 RPM.	C.-Wheeler	
50 "	900 "	A.C.B.	
50 "	900 "	Westg.	
75 "	900 "	Westg.	
100 "	900 "	C.G.E.	
300 "	720 "	Westg.	

220 Volts 3 Phase 60 Cycle			
5 H.P.	1800 RPM.	Watson	
7 "	1800 "	A.C.B.	
10 "	1200 "	S.G.E.	
10 "	900 "	A.C.B.	
75 "	900 "	Westg.	
75 "	720 "	Westg.	
100 "	720 "	Westg.	

2200 Volts 3 Phase 60 Cycle			
50 H.P.	1200 RPM.	A.C.B.	
100 "	720 "	C.G.E.	
200 "	514 "	C.-Wheeler	

1—75 K.W. 2300 volts 60 cycles 3 phase 900 rpm. G.E. revolving field type generator.
1—250 K.W. 600 volt 60 cycle 2 phase 600 rpm. C.G.E. revolving field type generator

TRANSFORMERS
3—15 K.V.A. 2200-550 volts 60 cycle C.G.E.
2—30 K.V.A. 2200-220/110 volts 60 cycle Wagner
2—200 K.V.A. 2200-220/110 volts 60 cycle Packard

110 VOLTS			
6 H.P.	1850 RPM.	C.G.E.	
6 K.W.	1465 "	Westg.	
8 H.P.	1200 "	Union	
10 "	700 "	G.E.	
11 "	700 "	Westg.	

DIRECT CURRENT MOTORS AND GENERATORS			
220 VOLTS			
20 H.P.	925 RPM.	C.G.E.	
50 "	950 "	Westg.	
90 "	925 "	Westg.	
100 "	650 "	Bullock	

500 VOLTS			
10 H.P.	1000 RPM.	A.C.B.	
10 "	1400 "	A.C.B.	
20 "	1000 "	A.C.B.	
25 "	950 "	Westg.	
50 "	825 "	Westg.	
60 "	900 "	Westg.	

All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL

FOUR OF MANY

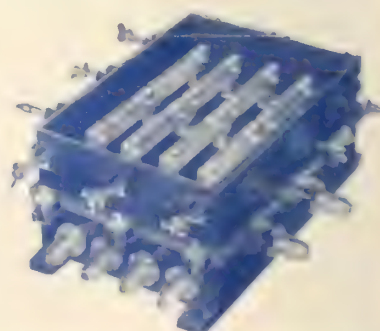
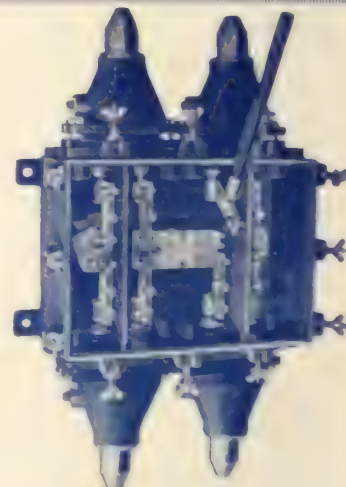
At the left a 6600 volt single conductor pothead.
At the right, 2300 volt four way two conductor primary distribution box.

Lower right, bolted link type of box for D. C. net work junction.

Below, six way low tension distribution box designed for narrow wall space.

Each is only one of a complete range covering its class.

*New Bulletins (Potheads 211-
Boxes 212) now on the press*



G & W ELECTRIC SPECIALTY CO.

7440-52 So. Chicago Ave-

CHICAGO, U.S.A.

A. H. Winter-Joyner, Ltd., 62 Front St. W., Toronto.
A. H. Winter-Joyner, Ltd., 10 Cathcart Street Montreal.
Bentz-Richardson Co., Ltd., 592 Notre Dame Ave., Winnipeg.
General Supplies, Limited, Calgary and Edmonton.

Electrical News

Engineering Contracting Merchandising Transportation

The Canadian Ironer Sells Easily at Good Profit

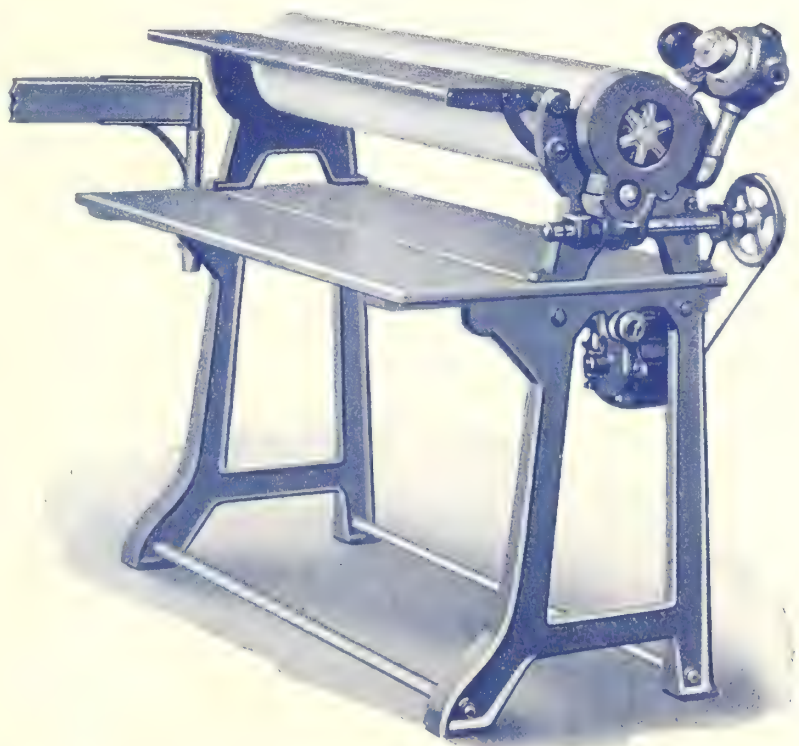
This time and labor saving machine has proven a big seller everywhere. Simple and efficient in operation, it will do in one hour work requiring half a day by hand, and do it better. The Canadian Ironer is supplied in three sizes, 46 in., 42 in., and 37 in., actual ironing width, and either Electric, Gas or Gasoline driven.

**Every Club
Institution
Sanatorium
Boarding House
Hotel and Laundry
Is A Good Prospect**

Housewives too, quickly see the saving effected by this machine and are quickly sold. The "Canadian" will last for years.

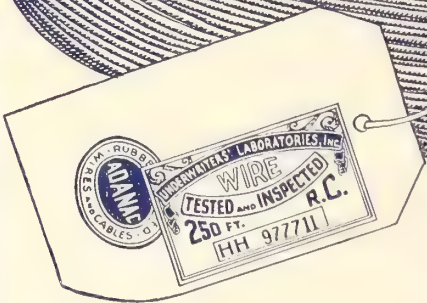
We will be glad to explain our agency proposition to you. Write for Catalogue and see us for all kinds of Electrical Laundry Machines

**Notice—Don't fail to get
our new revised price
list with discounts . . .**



MEYER BROS. 99-101 Queen St.E., TORONTO
423 St.James St., MONTREAL
ESTABLISHED 1884

Light and Power



Putting the "Spark of Life" into Canada's Greatest Buildings.

Adanac

the Wire Supreme

UNIFORM Quality and Dependability are the two
vital factors to be found in Adanac
Insulated Wire.

The fact that the greater number of our Hospitals, Banks,
Theatres, Hotels and Office Buildings are now wired with
Adanac is proof of its popularity and established
reputation.

*You make no mistake when you use
or specify ADANAC*

Northern Electric Company LIMITED

MONTREAL
HALIFAX

QUEBEC
OTTAWA

TORONTO
HAMILTON

LONDON

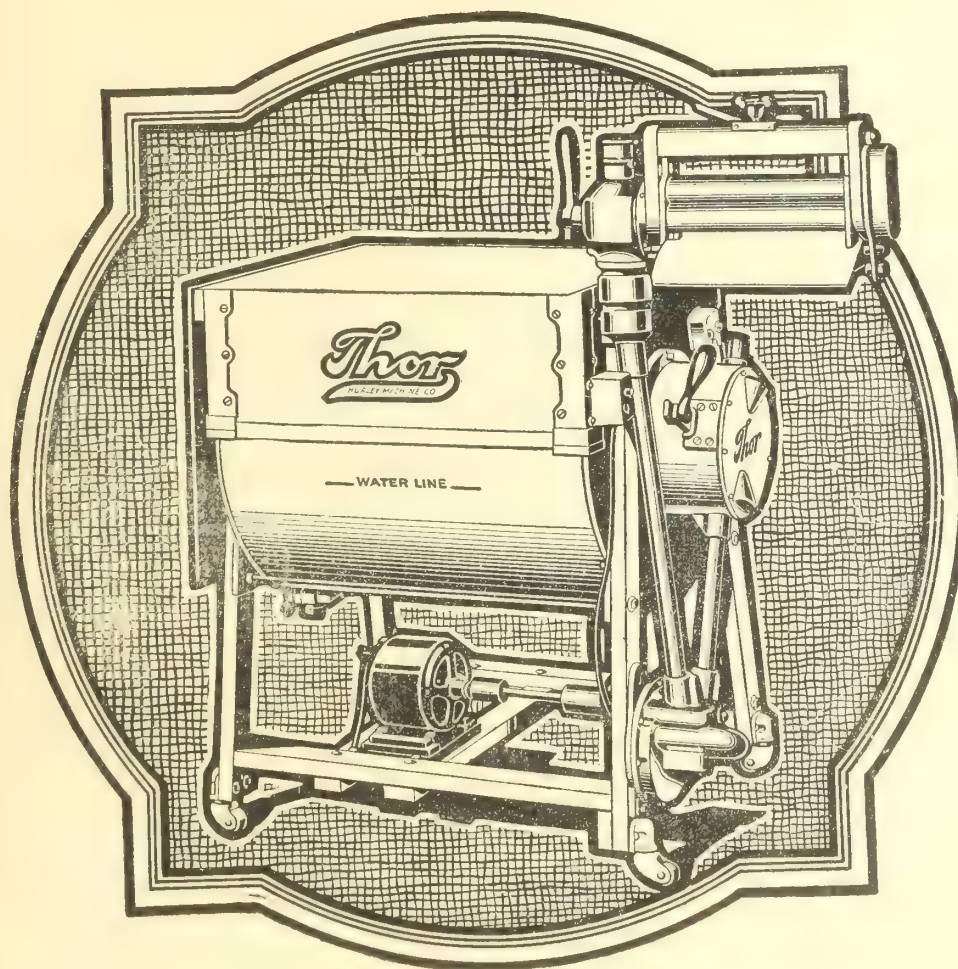
WINDSOR
WINNIPEG

REGINA
CALGARY

EDMONTON
VANCOUVER

In the long run—

it always pays
to sell the best



*For fourteen years the Thor has been
the acknowledged leader of its field*

Hurley Machine Co., Limited

Room 419, Ryrie Bldg., Yonge and Shuter Sts.

Toronto, Canada

Profitable Service

OFF ALL the nerve-racking, energy-sapping duties that fall to the lot of the average housewife, washing easily ranks first. Place a Miss Simplicity in a home, therefore, and you perform a service that will be appreciated by every single member in that home.

Miss Simplicity is a positive delight to sell because of the happy appeal it makes—an appeal upon which you can capitalize and make Miss Simplicity one of the fastest and easiest sellers you could ever wish to handle.

Miss Simplicity has everything in its favor. Expert and careful workmanship; high quality materials; perfect in every mechanical detail; simple yet efficient in operation, and priced, quality considered, at a very low figure.

Every home wired for electricity is an outlet for a Miss Simplicity. There are hundreds of prospects in your immediate neighborhood. Write now for our dealer offer. You will be agreeably surprised at the margin of profit on every sale.

We are prepared to supply our dealers with attractive advertising material to help along Miss Simplicity sales. Full particulars of this and of our liberal guarantee will be sent with offer.



**"Takes Out the
Drudgery With
The Dirt"**



W. A. KRIBS COMPANY LIMITED
Hespeler, Ont.

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Great West Electric Company,
Limited
Winnipeg, Man.

Quebec Distributors:
Northern Electric Company,
Limited
Montreal, P.Q.



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O-B SUSPENSION INSULATORS

Indorsed by Conclusive Evidence

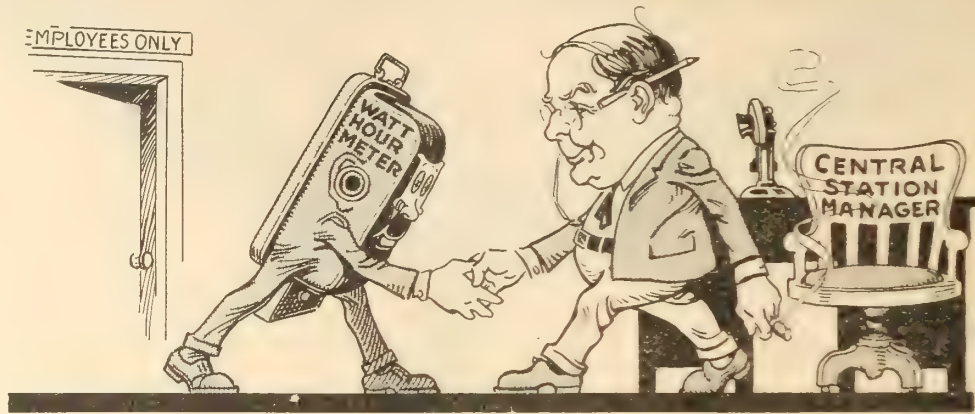
There is a tremendous responsibility carried by O-B Suspension Insulators. They are widely used. They serve on long and short lines. They are on duty in every climatic district. They carry lines of both high voltages and moderate. Unless they were reliable, this very popularity of O-B Suspension Insulators would wipe them out.

For with the enormous quantity which is in service, the failure of any appreciable proportion would amount to a calamity.

But the real conclusive test—time on the line—has established the trustworthiness of O-B Insulators.

Additions to the O-B Insulator Plant have been completed. Reasonable delivery.

THE OHIO BRASS COMPANY, Mansfield, Ohio



"You're a Good Worker but You Need Help"

A wattmeter is an exceptionally accurate instrument for measuring actual kw. hour consumption—but—no current consumer should be billed on a basis of energy consumption alone.

Each one of your customers should pay his share of your fixed charges—because, in a hydro-electric plant, this part of your cost of doing business amounts to from 80 to 90 per cent. of the total.

And, this important item should be measured just the same as you now measure kw. hour consumption.

The Lincoln Maximum Demand Meter accurately measures your customer's demand. Working with a watthour meter, a Lincoln Meter enables you to bill each customer wholly upon a metered basis. As no part of any bill is estimated, you and your customers know that you are distributing equitably your fixed charge costs.

We have on the press a complete treatise on why you should take your fixed charges into consideration in billing your customers and why you should meter, not estimate, this important item. Write for a copy.

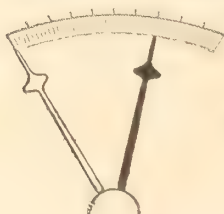


Hand now on
left varies with
load and
shows this
load at any
time of day.

Hand now on
right moves
only to right
and indicates
maximum load
since last re-
setting.

Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374

Lincoln
MAXIMUM DEMAND
meter



Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World

To Our Patrons In the Province of Ontario

We are pleased to inform you that we have opened an office and show room at 105 Victoria Street, (Room 116) Toronto, under the management of Mr. W. R. S. Careless, who will be pleased to receive a visit from you at any time and will show you material of our latest manufacture.

Trusting you will favor us with a continuation of your valuable patronage and that you will find this office a convenience, we remain,

Yours very truly,

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame St. West

Montreal, Que.

Ajax Plural Socket Plugs

(Patent applied for)

THE PLUG OF A THOUSAND USES

In a Class by Itself—Made for a Purpose—It Fills Requirements

Packed in Individual
Cartons
Ten
In Display Carton



Three Color Combination
Easel and Hanger as Illustrated
Furnished Free With Each
Display Carton



Canadian Prices
No. 22 — Double
Retail
Now \$1.25 Each
Three for \$3.50

Canadian Prices
No. 33. — Triple
Retail
Now \$1.50 Each
Three for \$4.25



Same Discounts Still Apply

Leaves Lamp In Position Intended.

The Only Plural Socket Plug Made Right For One Lamp And Appliances.
Other Plural Socket Plugs with both socket shells at an angle were intended for two carbon lamps, before appliances were in general use.

Do you want a plug to fit conditions as they were seventeen years ago, or as they are today?

Would you buy a 1904 Model Automobile in 1921?

Ajax Plural Socket Plugs Are 1921 Models

Made Right - Priced Right - Advertised Right

Are You Getting Your Share of This Demand?

Dealers—Order from your Jobber!

Jobbers—Get Our Proposition!

Ajax Electric Specialty Co.

1011 Market Street, St. Louis, Missouri

A B C

A Complete Line Soundly Backed By A Veteran Maker

As occurs in every new industry today there are innumerable beginners foisting experimental electric washers upon dealers in the hope of securing an eventual foothold. Woe betide those dealers who lend ear to the honeyed promises of inexperience and allow the siren of prices based on visionary rather than actual cost to lure them! For a year hence, the mortality among these hopefuls will have sorely embarrassed many of those dealers who succumb now to the wiles of temporary new makers. How

can these new factories produce and sell good appliances for less than the large veteran establishments with their big outputs? Obviously they cannot do so and long remain in business. It is better for dealers to take on only such lines as are already soundly entrenched. The A B C is such a line—backed by veterans in the industry, the great twelve-year old, \$2,000,000 factory of Altorfer Bros. Company. Exclusive dealerships open. Write nearest distributor, or us.



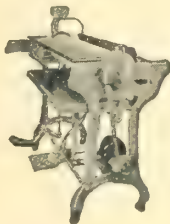
Some lift
and dip

Others rock
and toss

The ABC
does both

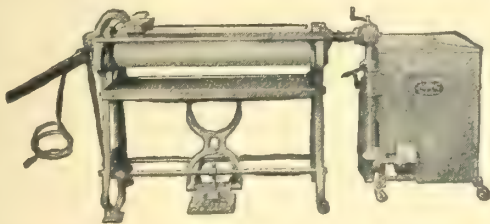
A B C Super Electric Washer

Open, semi-cabinet and full cabinet models. Maple or zinc cylinders. Copper or galvanized tubs. $\frac{1}{4}$ h.p. motor. Also equipped for power drive.



A B C Electric Ironer

Foot pedals apply and release ironing pressure. 45-inch roll and shoe. One-piece steel ironing roll; 8-inch diameter; 7-inch non-warping ironing shoe. Result: faster, uniform work. Shoe drops back 4 inches. Enclosed parts. Equipped either to operate off any A. B. C. electric washer, or with individual motor.

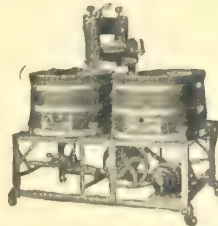


A B C Electric Laundress

*Washes - Wrings - Irons
With a Single Motor*

The only complete home laundry unit. Detachable wringer. Ironer shaft attaches to wringer post. Saves cost of extra motor.

The "Iron All" attachment superbly irons the difficult operations—ruffles, collars, cuffs, children's dresses.



A B C "Alco" Washers

Dolly type. Underneath drive. Single or double tub. Oversize motor. Machine-cut gears insure absolute quietness of operation. Also furnished for power drive off gasoline engine.

A Full Line Under One Famous Name—Investigate!

ALTORFER BROS. COMPANY, Pioneer Makers of Power Washers and Ironers
Factories and Executive Offices, Peoria, Illinois

C. D. HENDERSON, Canadian Representative, Box 123, BRANTFORD, ONT.

WHOLESALE DISTRIBUTORS

MARITIME PROVINCES
Blackadar & Stevens, Roy Building, Halifax,
N. S.

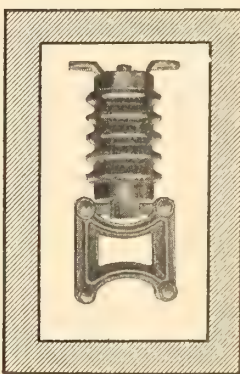
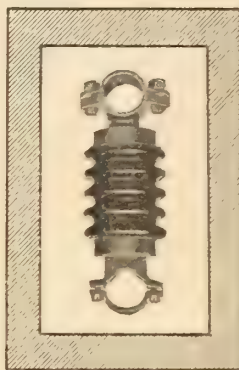
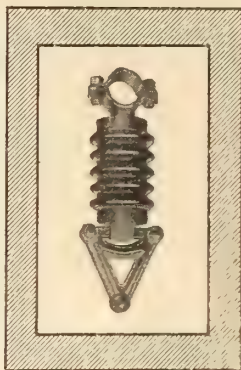
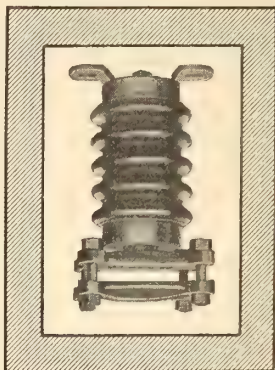
QUEBEC
Dawson & Co., Ltd., 148 McGill St.,
Montreal.

ONTARIO
The Central Electric Supply Co., Ltd., 36
Adelaide St. West, Toronto.

SASKATCHEWAN
Sun Electrical Supply, Ltd., Regina.

ALBERTA
Cunningham Electric Co., Ltd., Calgary.

BRITISH COLUMBIA
Rankin & Cherrill, Vancouver.



Logical

Where your requirements are such that—

A universal type of bus bar support is desired.

Where changes may occur.

When you want—

Safety

With Quality

With Changeability

With adjustments

And at a moderate cost.

Then Specify "FRANKLIN JUNIOR"!

Our Bulletin No. 1000, fully picturing and describing "FRANKLIN JUNIOR", will be gladly sent upon request.

**ELECTRICAL DEVELOPMENT
& MACHINE COMPANY**

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SALES AGENTS

EASTERN STATES

CENTRAL STATES

Utility Products Corp.

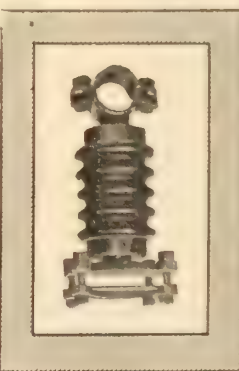
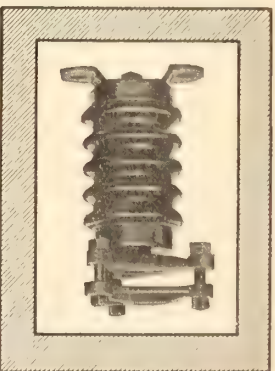
Midstates Engineering Co.

50 Church Street

Westminster Building

New York City

Chicago, Ill.





A Galvaduct Building
DUPUIS FRERES LIMITED
St. Catharines Street, Montreal.

Galvaduct Loricated

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you
—write us.

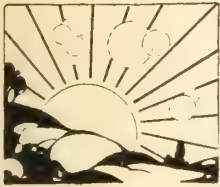
CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

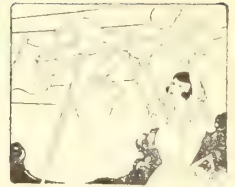
Western Sales Office: 602 Avenue Building, Winnipeg





Sunnysuds

Electric Washer & Wringer



--Will Outsell Because It Undersells!

A standard electric washer and wringer selling for \$150!

An electric washer complete and correct in every detail, retailing at the long hoped for price \$150!

A washer designed to wash perfectly, built to give permanent satisfaction—and priced to sell easily! Literally the sensation of the washing machine industry!

But selling at the price it does, the Sunnysuds has not been compromised to meet that price. Not a single part has been slighted either in design or production. The enameled snow-white open frame is built of rigid pressed steel. The copper oscillating tub is equipped with agitators and has a six sheet normal capacity. The 12" wringer is aluminum. The motor is especially built by the Domestic Electric Co. All gears run enclosed in grease. A trim, attractive, easy-to-use, and easy-to-sell electric washer—the Sunnysuds!

The skeleton of the Sunnysuds sales organization has been formed. Additional dealers are being rapidly added to take care of shipments which begin during June. Correspondence is solicited from dealers adequately financed and sufficiently aggressive to successfully merchandise a remarkable washer at a remarkable price. Attractive discounts.

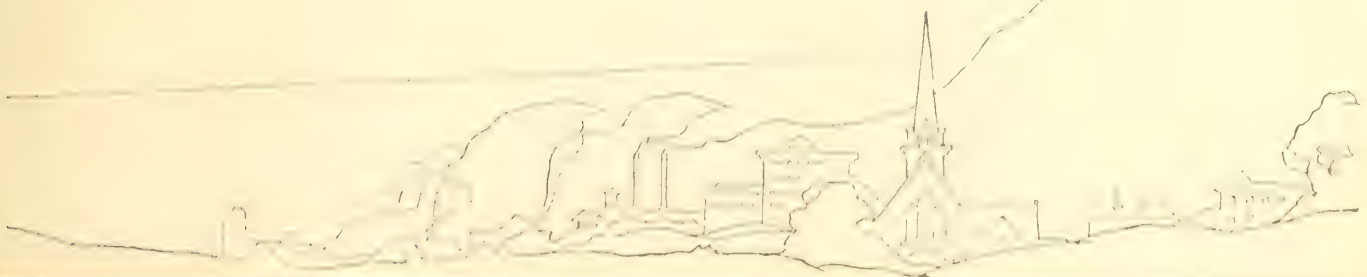
Onward Manufacturing Company

Kitchener, Ontario

Retail price

\$150

Winnipeg and West \$165



**When You Think of
Non-Metallic Conduit
Think of
"TRIDUCT"**

**When You Think of
Armored Conductors
Think of
"TRICABLE"**

**When You Think of Either
Think of the Better Jobbers**

**General Sales Agents
CONDUITS COMPANY LIMITED
33 Labatt Ave., Toronto**

Wirelets



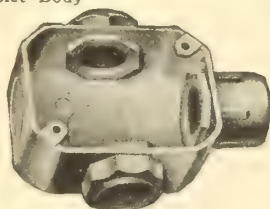
Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

FERRANTI METERS

Ferranti Meters are made to give a permanent service in constant accuracy.

Their actual record in the electrical field proves that they unfailingly serve the purpose for which they were made. They are specified where only the utmost in efficient accuracy is tolerated.



WATT METER

Ferranti Meter & Transformer Mfg. Co. Ltd.

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TORONTO

128 Bleury St.
MONTREAL

Simpson Bldg
HALIFAX

145 Market Ave.
WINNIPEG

Northwestern Engin-
eering & Supply Co.
CALGARY

Northern Ontario
J. P. Bartleman
Timmins



A Spare Set of Bearing Bushings in Every Motor

Delays in manufacturing operations, resulting from bearing troubles in ordinary electric motors, are eliminated by the distinctive, patented bearing in the Howell Red Band Motor.

The Howell Motor is so built that it really contains two bearings in one—a spare set of bearings always ready for emergency use. When the Howell bearing ultimately wears, so that the rotor touches the stator, it is only necessary to turn the outer bushing half way round to recenter the rotor. Costly delays are thus avoided.

The recentering bearing is but one of the many exclusive Howell features which assures never-faltering motor service with freedom from repairs.

*Sizes of Howell Electric Motors are
one to one hundred horse-power.
Write or wire your requirements.*

Howell

RED BAND
ELECTRIC

The Red Bands Assure Long-Continued Service

Red bands encircling every Howell Red Band Motor are our pledge, and your assurance, of correct electrical and mechanical design. They are our guarantee, and your guarantee, of exclusive features in construction that insure dependable service.

They are the visible pledge of our determination to keep faith with Howell Red Band Motor users in every corner of the earth. They are your assurance of eminently satisfactory motor service.

Howell Electric Motors Company

Howell, Michigan, U.S.A.

ELECTRIC MOTOR & MACHINERY CO., LTD.

417 St. James St. Montreal, Can. 64 Wellington St. W., Toronto, Can.

MACHINERY & ELECTRIC SUPPLY CO., LTD.

906 Electric Railway Chambers, Winnipeg

W. W. FRASER,

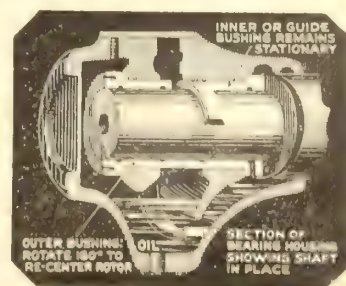
602 Hastings St. W., Vancouver

Profitable Business For Motor Dealers

The Howell dealer organization is being enlarged to keep pace with our greatly increased manufacturing facilities.

And motor dealers who are qualified to render high standard service—the unusual type of service expected by the Howell motor user—will find the Howell agency a most valuable asset. Every Howell Motor dealer is offered sales co-operation direct from the factory—co-operation which results in the sales of motors, and builds up a profitable business for the dealer. Write today for complete information regarding the Howell franchise.

Motors





Jefferson
"515"

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A Pleasing Deviation From the Ball Globe

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo glass, with standard 6" fitter. Adaptable for any business lighting.

GET ON THE "515" AND CREATE NEW BUSINESS

*Ask for Our New Booklet of Commercial
Lighting Units*

The Jefferson Glass Company, Limited

Head Office and Factory: 388 Carlaw Avenue
Toronto

Showrooms: 164 Bay St., Toronto
272 Main St., Winnipeg

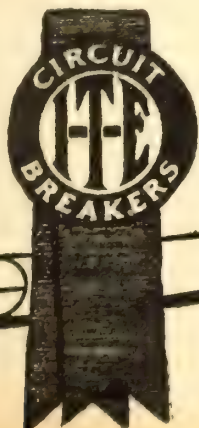
285 Beaver Hall Hill, Montreal
510 Hastings St. W., Vancouver

We wish to advise our customers that until further notice we shall continue to accept Canadian funds at par, investing the same in Canadian securities

The Cutter Company

Bank of Hamilton Building
Toronto, Ont.

Main Office and Factory
Philadelphia, Pa.



I-T-E
Circuit
Breaker
Engineers



INSULATION PROBLEMS

Is your problem one of superior insulation? Is it one of finding a material of high di-electric strength?

Do you require a material that is tough and strong? One that will not crack, chip, break or deteriorate with age and usage? Must it be adaptable to bending, twisting or forming? Is easy machinability and fine finish a factor?

DIAMOND FIBRE will fulfil all these requirements and more.

It does better work at less cost than any other material. Supplied in standard sheets, rods or tubes machined by us to your specifications

CONDENSITE CELERON is another of our products made specially for use where a water proof Fibre is needed.

Send for catalogue, Ask our experts to give you their opinion and advice on any special production problem that is worrying you.

Diamond State Fibre Company
of Canada, Limited.

Head Office and Works
235 Carlaw Ave, Toronto, Canada
Montreal Branch
84 St Francois Xavier St



Polar Cub MOTORS



B86 VIBRATOR

To Retail at \$15

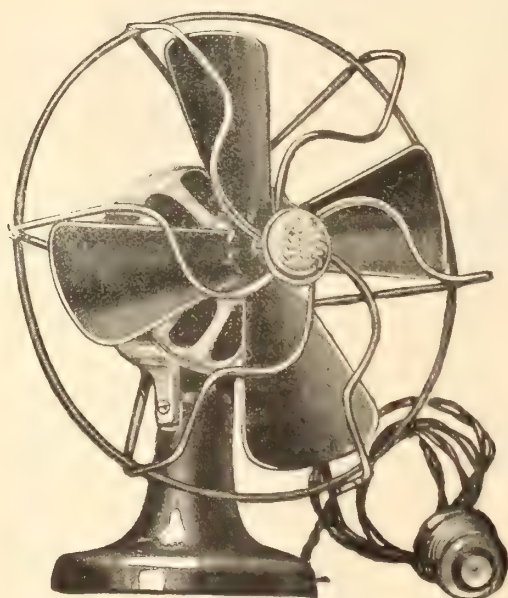
A powerful motor driven vibrator for household use. Complete with 3 applicators, brush, cup and button in attractive display box.

The Best Selling Item in the Trade To-day

GILBERT B683 SEWING MACHINE MOTOR A Sure Profit Producer



For Retail at \$16.50



Polar Cub ELECTRIC FAN

Six Inch Size—\$10.50 Retail

Nine Inch Size—\$16.50 Retail

An early season means a long season and big profits—If you have the fans. This season will probably duplicate that of 1919 when everyone was short of fans.

DON'T DELAY A MINUTE

Wire your orders for six inch and nine inch fans at our expense. **DO IT NOW!**

THE A. C. GILBERT-MENZIES CO. LTD.
439 King Street West TORONTO

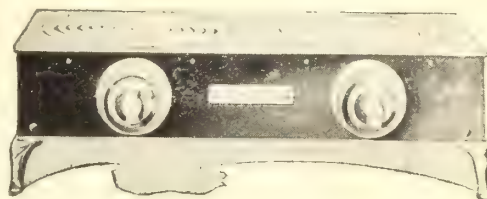
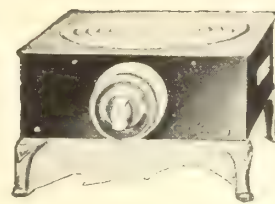
Manufacturers of Gilbert's Erector—Toy Electrical Sets—Toy Motors, etc.

Agents for Gilbert's Polar Cub Fans and Electrical Specialties

MOFFAT'S ELECTRA'S



A few reasons why you should handle Moffat's Electras constructed with heavy Armco iron, four times the life of steel. Insulated double jointed nickel plated doors with white enamel panels, mercury or round compensating thermometer. Quick powerful burners, wire under the burners protected from moisture. Each burner supplied with individual covered cutout. Burner coils made from heavy chromium nickled wire; burners easily removed and do not require experts to make repairs. Three heat switches and heavy duty switch for 1700 watt burner. Hot Plates are sturdy, well constructed with same burners as the Ranges. A large stock always on hand. Write for catalogue and discount sheet.



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MONTREAL

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Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price \$2.50.

Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, published in 1917 by McGraw-Hill Co., Inc. 285 pages, illustrated. Price \$2.50.

Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price 50c.

Electric Railway, by A. Morris Buck, M.E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated.

"Engineering Electricity", by Ralph G. Hudson, S.B., 190 pages illustrated. Published in 1920 by the John Wiley & Sons, Incorporated. Price \$2.00.

Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price \$1.50.

Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price \$3.00.

"How to Sell Electrical Labor-Saving Appliances", by Electrical Merchandising, first edition, 115 pages, illustrated. Published in 1918 by McGraw-Hill Book Company, Inc. Price \$1.00.

Practical Electric Illumination, by Terrell Croft. First edition, published in 1917 by the McGraw-Hill Book Co. 225 pages, illustrated. Price \$2.00.

Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price \$4.50.

Principles of Electrical Design—D.C. and A.C. Generators, by Alfred Still. Published in 1916 by McGraw-Hill Book Co. 365 pages, illustrated. Price \$3.00.

Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price \$2.00.

Radiation, Light and Illumination, by Steinmetz. Published in 1909 by McGraw-Hill Book Company. 304 pages, illustrated. Price \$2.00.

"Storage Batteries", by C. J. Hawkes, 157 pages, illustrated, published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.

Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Published in 1917 by Longmans-Greene & Co. 102 pages. Price \$1.00.

Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.

"Theory and Calculation of Transient Electric Phenomena and Oscillations", by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.

The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.

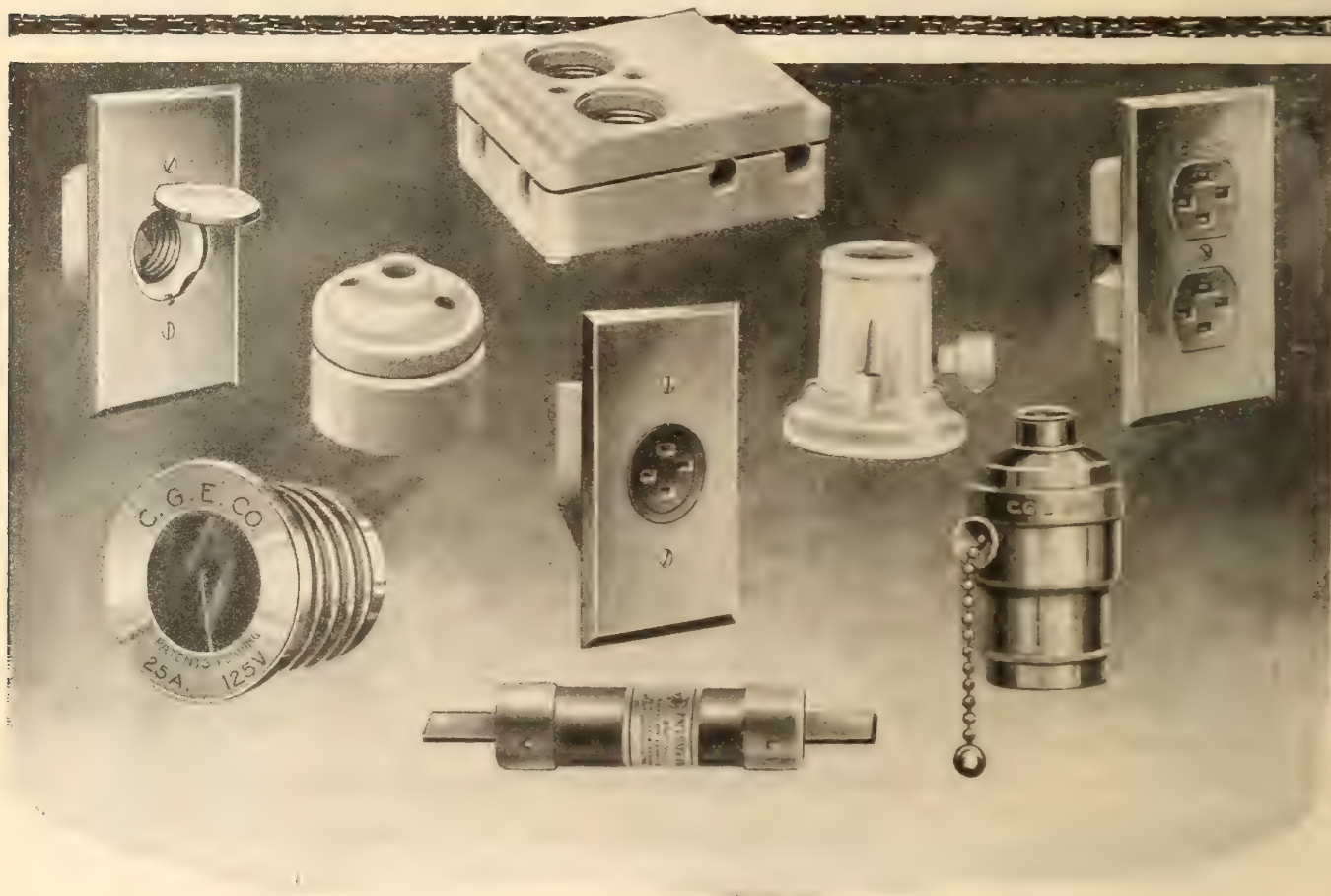
The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1). Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.

The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 50c.

ELECTRICAL NEWS,

347 Adelaide St. W., Toronto, Ontario

*The efficiency of an electrical installation is largely dependent on the
RELIABILITY of its WIRING DEVICES*



Electricity, the Friend of Mankind

ELECTRICITY has done much to make the lot of man easier.

The housewife and the school child, the factory worker and the busy executive all benefit by the co-operation of electricity in their daily tasks.

The degree of satisfaction derived from any electrical installation largely depends upon the quality of the Wiring Devices used. The knowledge that C.G.E. Wiring Devices have been used throughout on an installation, guarantees freedom from trouble and disappointment.

**Made in
Canada**

Canadian General Electric Co., Limited

Head Office



TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson, and Victoria.



Durable Construction

THE drawn steel used in the frame and base of the R & M Fan is extra thick— $\frac{3}{32}$ of an inch—and the fans are stronger and more rigid than the heavy cast iron fans. The gears in the oscillating device are large and accurately fitted. The windings are heavily taped and thoroughly impregnated with a moisture-proof insulating compound. The blades are heavy sheet brass, mount-

ed on a steel carrier. The switch and speed coil are mounted on a heavy moulded insulation base which has great mechanical strength.

In every detail the R & M Fan is built as ruggedly as it can be made. The purchaser of a fan is vitally interested in its durability, and many sales are made easy for the dealer because of the rugged construction of the R & M Fan.

The Robbins & Myers Company of Canada, Ltd.
Brantford, Ontario

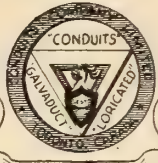
Robbins & Myers Fans



Condulets



Conduit Fittings



Wiring Devices



Square D Safety Switches



Flashlights



Lighting Fixtures



Indicating Instruments



Protective Switching Apparatus



Graphic Instruments



Electric Signal Apparatus



THE KEY TO SAFETY

Trade-marks Representing Quality Products

IT GIVES us genuine satisfaction to be associated with the companies represented by these well-known trade-marks.

Each trade-mark stands for a quality product of the highest grade that has long since established its worth wherever electrical work is done.



Electrical Apparatus



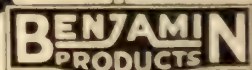
Wharoid & Fittings



Switchboard & Protective Fittings



Control Apparatus



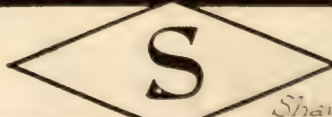
Wiring Devices



Shawmut Fuses

Northern Electric Company LIMITED

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HALIFAX	TORONTO	WINNIPEG	EDMONTON
QUEBEC	HAMILTON & LONDON	REGINA	VANCOUVER





For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By
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No. 12

No Argument for Continued Depression in Canada

One of the surest signs that our industrial depression has passed the crisis and that things are surely, if slowly, on the mend is the pessimism of the very men who were optimists a year ago. Long after everybody else had recognized the fundamental necessity for a period of readjustment these men were still plunging ahead, spending money lavishly, and acting as if the boom times would continue forever. Their judgment was bad and their business has suffered. To-day, these same men are in the depths of despondency, and the future holds nothing but gloom. When everybody else is beginning to feel that the atmosphere is clearing they will not see it.

This type of man has a certain value in the community when we get to know him. He is a useful barometer for other to be guided by. He belongs to the same class as is said to be the plague of the stock market—the man who can never sell because he sees his stock going a point higher tomorrow and never buy because he thinks the market may go lower. He is little comfort to himself but he acts as a weather-vane to those around him—while he insists on pointing north they realize the wisdom of going south.

So it is in the industrial field to-day. Evidences are multiplying daily that we have turned the corner, yet the chronic "sticker" says "Terrible times ahead." We don't believe it. No sane man is looking for boom times in the

near future, of course, but what most men do look for, we feel sure, is a movement towards improvement that will gain a considerable momentum before the year is out and be going strong during 1922.

Much depends on the building trades, on the prices of general commodities and on labor. The prices of general commodities have dropped very considerably. Building, in spite of high costs, is making a good record. Labor, we believe, is recognizing in general the necessity for greater production without increased costs. Wages are already receding and will do so further in keeping with the prices of other things.

Optimism, tempered with common sense, and courage to be guided by our judgment rather than our fears, is what Canadians need during the next few months. If there is any argument for a continued depression in Canada we have yet to hear it.

Postponement of P.Q. Number

Owing to the printers' strike in Toronto, the Province of Quebec Number of the *Electrical News* which it was proposed to publish June 15th, has been postponed until next month. The exact date will be announced later. The required work on this number by both the Editorial and Mechanical Departments has been found to be very great and this postponement will enable us to do it greater justice. It promises to be one of the most interesting numbers of the *Electrical News* that has ever been issued.

Notwithstanding the strike, we are carrying on. Every man left our employ in a demand for shorter hours and higher wages--36 per cent increase in our cost of production.

Toronto, from a printing standpoint, is almost 100 per cent unionized, so the fight is not easy. We have been able to produce this issue. From the President down to the message boys our coats are off, determined that there shall be no break in publication if we can prevent it. We respectfully ask consideration from advertisers and readers. We believe we are fighting your battles as well as our own. The line must hold.

Hydro Approvals Committee Asks Opinions On Fixture Standards

The Fixture sub-committee of the Approvals Committee of the Hydro-Electric Power Commission held a conference on Monday, May 16th, last, with about 25 electric fixture manufacturers and others interested in electric fixture work, to discuss the standardization of fixture supports.

At this conference it was decided that the Fixture sub-committee should draw up a suitable questionnaire dealing with this subject in order that those most concerned might have an opportunity of expressing their views.

The Fixture sub-committee has met on this question and as a result the following is submitted for your consideration, a definite proposal being thought more satisfactory than a mere questionnaire.

It is proposed:—

(a) That circular steel boxes of three and one quarter (3¼) inches diameter and one and three quarter (1¾) inches deep, as at present in common use, be used as a standard

minimum sizes, for general purposes, for wall lightning outlets.

(b) That boxes be provided with fixture studs, which must be removable, and also with ears arranged to take a suitable cover.

(c) That the covers be so designed that they can be plastered over so as to leave an opening in the plaster measuring two (2) inches vertically and one and a half (1½) inches horizontally.

The proposals given above take into consideration the following:—

(a) That a 3¼ inch diameter box 1¾ inches deep is in common use now.

(b) That a box of this size appears to be large enough to suit most ordinary requirements and will, without change, if the fixture stud be removable, be able to accommodate some of the various outlet connecting devices which are now being developed.

(c) That if a large box be needed in any particular case it can be installed.

(d) That the opening in the plaster two inches by 1½ inches appears to be large enough to enable the wires to be handled conveniently, and that it can be covered by a three inch diameter plate, or a fixture back of 2 inches in width.

It was considered that no particular requirements need be specified for ceiling outlets.

It is pointed out that the foregoing are suggestions made for the purpose of eliciting comments and as it is recognized that, in matters of this kind, there will be differences of opinion, some of them possibly widely divergent, each recipient of this letter is requested to give definite reasons for his attitude toward the questions involved.

Naturally, the particular interests of each individual or firm will be of special importance in his or their own view, but if due consideration be given to the needs of others and to the future requirements of the industry, in a spirit of fair play, it is hoped that some understanding may be arrived at which will be reasonably satisfactory to all parties, including the public.

Although, as will be seen from paragraph 5 above, no proposal has been made regarding ceiling outlets, comments on this question will be welcomed should any person consider it desirable to specify definite requirements for such outlets.

Here is Another Way to Help By Co-operation

The electrical industry, as a whole, is interested in the questionnaires sent out recently by the Dominion Statistician, Mr R. H. Coats, asking for general statistical information. The Dominion Statistician is doing this work at great trouble and expense, and manufacturers are reminded that the value of the information gathered by Mr. Coats' department will be in almost direct proportion to the percentage of replies sent in—promptly.

Statistics regarding the Canadian electric industry are very meagre, and though it may be urged that the electrical information asked for in the questionnaire is not sufficiently detailed, nevertheless it will, unquestionably, be very valuable if it is accurate. Let us hope that when the next form is prepared more space will be given over to our industry. In the meantime, however, it would seem to be in the general interest that the answers to the questions submitted be given cheerfully and without delay.

Less Work—More Pay

The employees in the printing trades in Toronto struck June 1st, as predicted in last issue.

They were offered \$36 for a 48-hour week—a little more than they received last year when the cost of living was at the peak. This was refused.

They asked \$44 for a 44-hour week, an increase of 36 per cent.

The publishers and master printers believed it to be their duty to protect the buyer of advertising and printing. The strike of union printers is the result.

Think of it—less work and a lot more pay at a time when it is most essential to increase production and get back to normal.

Unreasonable wage demands and shop rules which place employers at the mercy of the unions must be checked.

This issue is late. Others may be late or be suspended entirely, but we do not propose to yield until a fair settlement has been forced.

The battle, dear reader, is yours as well as ours. Be considerate.

Manitoba Electrical Association Organized Like a Business Will Wield Powerful Influence for Development of the Industry in that Province

The industrial executive aims for the expansion and refinement of his business, and its methods, from year to year. The year in his natural cycle, enlargement his constant objective.

The degree of his success is determined by four factors:

1. How complete and accurate a picture he can secure of all existing conditions and methods within his business.
2. To what extent he has available definite recommendations for practical improvements, and how well he is informed of the relative importance of each recommendation, and the effect of the improvement upon other factors.
3. To what degree he outlines a definite and complete program for betterment.
4. How well the program is put into practice.

The executive of the Manitoba Electrical Association, believing that the methods to be adopted to insure a successful association do not differ from those required to insure a successful industrial concern, have on the basis of the above reviewed the Winnipeg electrical industry, and as a result made certain recommendations to the membership at large, from which a definite program for the year's activities has been worked out. It remains now for the executive and membership at large, working in harmony, to complete a year of worth-while action. The plan as adopted by the association is shown herewith and may be explained as follows:—

At the head is shown the members at large, which would correspond to the stockholders of a corporation, while reporting to the members is shown the President, Secretary-

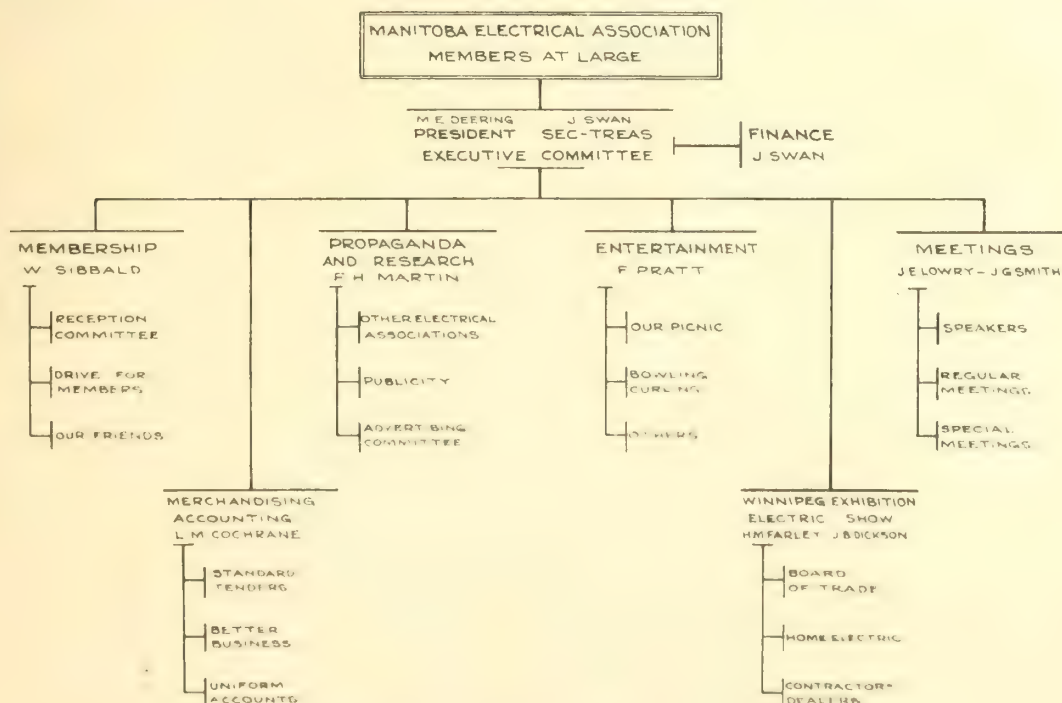
Treasurer and Executive Council, these representing the Board of Directors or Management.

It will be noted that finance has been definitely assigned and it is hoped that Mr. Swan, as secretary-treasurer, will be able at an early date to submit a budget for the year, and on the basis of which the executive will make their financial plans for the year. This method will insure a healthy financial condition at all times and thus prevent—what is so often found in similar associations—"stagnation due to lack of funds."

Six Departments have been created, each having three divisions. These are as shown by the plan—Membership, under W. Sibbald. Mr. Sibbald will have charge of three Standing Committees or Divisions, i. e. Reception Committee. As the name implies, this committee shall be in attendance at all general meetings with the specific duty of looking after the new members and our guests. The second committee will put on a drive for new members, while the third "our friends" will dispense "sunshine" to those of the members who, in time of sickness or trouble, would appreciate sympathy.

The second committee—Propaganda and Research—under F. H. Martin, will have three Divisions, i. e., "Other Electrical Associations," which involves largely the work of a corresponding secretary keeping in touch with all other organized bodies in the electrical industry, with the view of insuring the Manitoba Electrical Association having available at all times data as to what is latest and best in the way of association work. Mr. Martin will then have a good live publicity committee whose duties will embrace local newspaper as well as trade journal publicity for the association. The advertising committee will handle the work pertaining to the electrical supplement now running weekly in the local papers.

The Department of "Meetings" under Mr. J. E. Lowry and Mr. J. G. Smith will supervise the work of three committees—the first of which shall take upon themselves the



Organization Plan of Manitoba Electrical Association

Members of Executive of Manitoba Electrical Association



Frank H. Martin



H. M. Farley



L. B. Dickson



W. Sibbald



L. M. Cochrane



J. Gordon Smith

work of providing able speakers who can handle timely topics at the regular general meeting. The second committee will handle the work of arranging the time, place and form of regular meetings, as well as notices to members of such meetings. The third committee will devote themselves the work of arranging special meetings such as joint luncheons with Kiwanis, Rotarians, Board of Trade, etc.

The "Entertainment" Department, under Mr. F. Pratt, will supervise a committee in charge of a picnic which the association is to hold in July, while the second committee will make all arrangements for a bowling tournament in the Fall and curling in the winter. The third committee is to take charge of the association's efforts in all co-operative movements planned by the electrical association or other similar bodies—such as the Kiwanis picnic for orphans or any other deserving charities.

The Merchandising and Accounting Department, under Mr. L. M. Cochrane, will, it is thought, be one of the most popular among the members inasmuch as three committees under this department will all be conducting a work that is intended to bring the electrical industry to a higher plane and put it on a more satisfactory basis.

Mr. H. M. Farley and Mr. L. B. Dickson with the de-

partment covering the Winnipeg Exhibition and Electrical Show, will have three committees which should not be second to Mr. Cochrane in boosting the association. First—there is a committee to handle the work of affiliating the association with the Board of Trade. Second—a committee to make plans for a co-operative movement with real estate dealers, building, loan associations, etc., for the purpose of building an "Ideal Home," which of course is an electrical home.

Mr. Dickson, as president of the contractor-dealers association, will personally handle the third committee, whose duties shall be to seek closer co-operation with the contractor-dealers' association.

At the regular meeting of the association, Thursday, May 26th, this plan was outlined in detail to the members—the department heads each being given ten minutes to explain what he, as supervisor of three committees, hoped to accomplish during the year.

The above was heartily endorsed by a rising vote of all members, and there is no doubt but what the executive, having obtained thus a definite plan, can make the Manitoba Electrical Association one of the most popular and best-known organized bodies in the city.

Safety Features of Good Lighting

**Fifteen Per Cent of Serious Accidents Due to Poor Illumination —
Average Cost of Each Serious or Fatal Accident is 850 Weeks' Wages**

By S. G. H. Eiben — Illuminating Engineer, Westinghouse Lamp Company*

In discussing industrial lighting fixture equipment, and particularly its maintenance, we have entered upon an argument disclosing much that is vital in the accomplishment of all three of the desiderata of successful industrial operation, viz., production, speed, and safety. And since production depends upon the other two, or since all three are really synonymous, any arguments applying to the maintenance of a grade of illumination satisfactory for safety, will apply equally well to the others.

On account of the breadth of this subject, we shall not attempt to describe the various types of lighting fixtures on the market, nor indicate of what a satisfactory lighting installation consists. One may say in general that good or bad lighting depends upon two outstanding factors. Bare incandescent lamps, or unshielded glaring illuminants that not only do not illuminate but cause a contraction of the pupillary opening of the eye and resultant decrease in seeing ability, form one of these factors. More or larger bare lamps only aggravate this trouble and increase the hazard—the solution is found in the proper use of a good reflector, or a shielding fixture.

The second factor is the matter of insufficient light, and this is very largely influenced by lamp renewals, reflector and lamp cleaning, and the colors of surroundings, or whatever would be involved in maintaining the original installation up to its initial efficiency. It is this very important phase of applied illuminating engineering that will be discussed herein.

Insufficient illumination unquestionably reduces visual acuity, decreases the speed of muscular action, confuses the mind, and leads to accidents. A few figures will illustrate this point.

In the coal industry, for example, we think of coal mine accidents as resulting mostly from falling slate or gas explosions, whereas statistics show that for each one thousand men employed underground, there are eleven serious or fatal accidents a year, and for the same number of employees working above ground there are five serious accidents per year. In very few industries is the illumination so wretched, either above or below ground, and this largely explains why we find the abnormally high accident rate in both places. The five accidents that occur uninfluenced by underground hazards can be almost altogether attributed to either poor natural or poor artificial light, and doubtless more than one-third of the underground accidents arise from the same, or a greater insufficiency of light.

As another feature of the close relation between light, speed, and safety, we can cite the example of the tennis ball, which may be perfectly visible to each tennis player when held in the hand just before serving, but which when in rapid motion in the air is almost invisible if the daylight be weak. Any rapidly moving object must register its image upon the brain before we "see" it, and as in the photography of objects, there must in human vision be sufficient illumination of that object before our eyes—our human motion picture cameras—will record a clear impression of it. Muscular action cannot begin until after our brains have "developed the film," and hence our speeding up of action, either to produce or to pro-

tect, must first start with an understanding of the "time-element" of vision, and an endeavor to reduce this time to a minimum, by higher lighting intensities.

Granting, for a moment, that good illumination is largely dependent upon the care of the lighting equipment, let us see what valuation may be put on poor maintenance, in other words, what is the high cost of poor light. Figures that in general agree with insurance statistics (if they err, it is upon the safe side) show that the total annual serious accidents in industrial plants in the United States amount to 25,000 per year. That is the minimum figure. Out of this 25,000 we find 15 per cent. chargeable to poor illumination—either unshielded poorly directed light, or insufficient light. Now, based upon the average amount of employee's compensation paid, the equivalent lost time of each serious or fatal accident traceable to faulty illumination is 850 weeks, or the total annual time lost is over 3,000,000 weeks, roughly equivalent to the working life times of 1,000 men. If these men were earning \$25.00 per week, then practically \$80,000,000 in wages are lost annually, through improper lighting. If we add to this staggering sum the doctor's bills, medicines and losses of production we arrive at astonishing figures!

Artificial Intensities Too Low

One does not often think about the fact that the intensities of artificial light in industrial plants are much below the daylight intensities. We find daylight in factories running from 4 to approximately 50 foot-candles; general artificial lighting in factories for even fine factory work has this year been in the range from 4 to 12; medium factory work between 3 and 9, and sometimes down to $\frac{1}{2}$ or $\frac{1}{4}$ foot-candle for indoor passageways. Places like stairways, and the positions where accidents are the most prevalent are usually most poorly lighted and if daylight conditions here were reproduced even in the most meager way—even if we only approximated daylight conditions we could reduce accidents materially because statistics show that the largest majority of accidents occur in the night shifts. The percentage is about two to one—two accidents under artificial lighting compared to one accident under daylight conditions.

What Manufacturers Say

How do the manufacturers regard good lighting? Increased production, 79 per cent. of the manufacturers say, is their excuse for good lighting. Decreased spoilage, 71 per cent. say, is their reason. Fifty-nine per cent. of the manufacturers say that fewer accidents constitute their reason for good lighting, etc.

Offhand the manufacturers admit, without any argument at all, that in half of the cases they would have fewer accidents if they had better illumination.

Now it has been shown that the total cost of accidents, the total disability payments, and the total lost time of industrial operators in the United States amount to more than the total cost of artificial illumination. We should ponder over that fact! The total cost of artificial illumination in the United States is exceeded by the cost of accidents and the loss of production resulting from poor lighting, and yet 59 per cent. of the manufacturers already agree that poor lighting is directly or indirectly responsible for these acci-

*Before Illuminating Engineering Society

dents. Surely, then, it is logical to preach the doctrine of improvement, and the folly of inertia.

Insurance Data

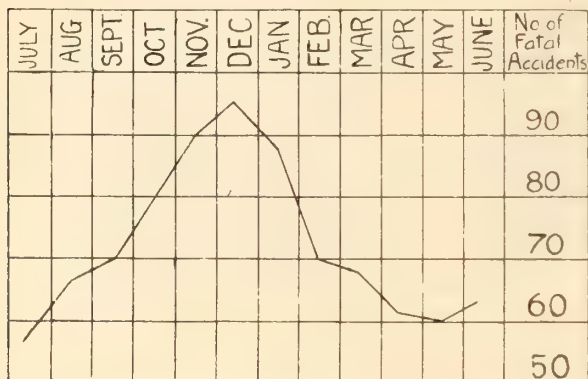
Data of reputable insurance companies prove that artificial lighting is connected in some way with accidents. In one class of labor during July and August there occur out of a maximum of some ninety-five accidents, about sixty. The rate rises in October, November, and December, falling off in January, February and March, as the days grow longer, and down to a minimum again in May, June and August, when daylight is a maximum.

This is not new information at all, but it adds weight to the argument that the fatal accidents or the serious accidents prevail in the darker seasons of the year. Other items, such as poor ventilation, low temperatures, etc., undoubtedly enter into these figures, but in tropical latitudes nearly this same ratio is found to exist.

Similarly, the majority of the accidents that do occur in the dark seasons occur when the daylight is insufficient.

Maintenance

Now, it can be shown how maintenance is responsible for good light, and conversely what poor light we will get when we do not consider maintenance. The first thing to do to get good illumination and to reduce the danger of the industrial accidents is to look to the interior finish of the rooms or the factories. This is termed "Painting for Light." In other words, ordinary white paint has a reflection value of, say, 82 per cent. Consider the ceiling of a room that is finished in gray-white and with a reflecting value of about



Relation between daylight and accidents
—More light, fewer accidents

75 per cent., then three-quarters of the light falling on the ceiling surface will be reflected. Now, if we were to neglect that fact, and were to paint our walls and ceiling medium gray, for instance, which would reflect 46 per cent. of the light, we have cut our available usable illumination practically in half. In the red and dark colors the reflection coefficients range in value to about 30 per cent. Hence one of the first things that will lead to better illumination and fewer accidents will be the attention given to the interior finishes of the buildings.

This question of light-colored interiors is very pertinent. Not only must one use light-colored paints to obtain high efficiency, but he must clean the paints or must maintain them. Some of us have worked a great deal in the steel mill districts where perhaps the cheapest thing in the factory would be white-wash, and yet this is the rarest thing that one can find. One rarely sees a steel mill white-washed, and yet the illumination of such a plant could frequently have been increased 20 per cent. by a coating of white-wash on black walls. Large expanses of pure white surfaces directly before a workman's eyes are not advisable, as neither are

unshaded windows, but a sensible use of both can produce remarkable improvements.

Cleaning

Cleaning is essential in maintaining lighting efficiency. When a typical reflector that has been in service several weeks is wiped, its candlepower in a downward direction is increased from 1,000 to approximately 1,350, with corresponding increases in other directions. When the unit is thoroughly washed with soapy water and ammonia, its downward light is increased to about 1,500 candlepower. Obviously a neglected lighting fixture cannot properly perform its work, and the ones that show dirt are in many cases preferable to those that do not, for they will probably be cleaned oftener.

Fixture Types

Though some fixtures in industrial plant lighting are affected more than others, yet all suffer so much that after two or three weeks time the light output is reduced to 75 per cent. of its original amount, or less. With the inverted type of glass bowl, or the semi-indirect types, there is a still more astonishing condition. Merely a thorough washing results in 26 per cent. more usable illumination and the cost of this cleaning as compared to the investment and operating expenses, is very small, scarcely reaching 30 per cent. of the latter. The slogan, "Water is cheaper than Watts," might well be printed on the card of every efficiency expert.

Depreciation

Comparing the depreciation of illumination in the office with that in the factory, we note that the factory units suffer more. This is reasonable because of the dirt and dust and usually an oily dust in the atmosphere of the factory. In a very dirty building, after three weeks of neglect, the illumination may drop from 4.0 to 2.0 foot-candles, and the only reason why such depreciation is allowed to continue is because the reduction is so gradual and the effects are so insidious.

If we assume or admit that cleaning of lighting fixtures and of light-reflecting surroundings is essential to efficiency, then why don't we clean? Is the cost prohibitive? It cannot be considered so, in comparison to the results secured. In a typical large building having glass lighting reflectors and rather elaborate commercial fixtures, we find that out of a total annual operating cost of lighting equipment amounting to \$14,438, the cleaning and maintenance is represented by \$4,633, or about 32 per cent., which may be taken as a fair proportion.

Small Cost of Good Lighting

Expressed in the terms of an evaluation of the working man and his possible output, the cost of good lighting is perhaps one-tenth to one-quarter of 1 per cent. If we can add to the workman's output, or eliminate lost time represented by not more than two minutes per day, then the value of his output in that short length of time will equal his share of the cost of lighting for the entire day. Expenditures for oil are sometimes greater than for light—are we then evaluating the machine higher than the man?

Typical Examples

In order to show what could be done with a neglected lighting installation, three factories were taken which had conditions that are found all too frequently. Case 1 was found with 2.6 foot-candles of average illumination intensity. Washing the units increased this illumination 37 per cent. to 3.6 foot-candles. Replacing old lamp bulbs with new lamps of the correct voltage-rating produced another increase of about equal amount, while finally a re-painting of the interior resulted in a final intensity of over 7 foot-candles, all without increasing the power consumption in the slightest. Cases 2 and 3 of this same experiment showed similar gains that resulted from intelligent maintenance, all adding weight of

testimony to the fact that it pays to clean.

Darkness Not Cheap

Probably the greatest safety slogan is the old railway crossing sign, "Stop, Look and Listen!" But if the old-time employee must stop, wipe his spectacles, and step to a window, in order to look, something is wrong with the illumination. If it is necessary to stop before looking, one has lost something, either efficiency of production or accuracy, or the chance to save one's self from accident and injury. If the factory is well lighted, the employees may look without stopping!

All these, and many more arguments, are being discovered as studies are made of efficiency and of safety as influenced by illumination. Many of us will recall the character Scrooge, in Dickens' Christmas Carol who "Liked darkness because it was so cheap," but in these modern times that idea has been utterly replaced by the larger truth that darkness in our industrial operations is very, very expensive.

The Functions of an Engineering Department

By W. S. Vipond

Under the functional system of organization which has been adopted by many large manufacturing companies, the organization is divided into several main branches, the principal of these being,—Administrative Branch, Sales Branch, Manufacturing Branch, Engineering Branch, Accounting Branch, Purchasing Branch.

The fundamental consideration in the lay-out of any organization is that it shall be such that the activities of the various branches shall so function that the work of the company shall be carried out in a truly co-operative and mutually beneficial way both to the company and employees, without friction or overlapping.

In such organizations the duties of all the different branches, with the exception of the engineering and manufacturing departments, are, as a rule, fairly obvious and can be readily defined. In large electrical manufacturing companies that manufacture apparatus of a technical nature, there is always a possibility for quite an overlapping in the duties of the engineering and manufacturing departments.

Experience has shown that a great deal of the overlapping can be eliminated by the proper definition of the duties of each of the departments, and it is the purpose in this article to give the writer's opinion as to what should properly be considered as the functions of an engineering department. These may be stated as follows:—

The engineering department conducts the company's research, experimental and development work in connection with the design of products, manufactured by the company, or for the company by others for use in manufacture by the company or for sale to customers.

The engineering department is responsible for the design of all apparatus and systems manufactured by the company, within the limitations set up by and agreed upon with the manufacturing department for commercial manufacturing practicability.

The engineering department is responsible for approval of specifications covering material and the designs of articles sold by the company under arrangements with suppliers, whereby the company acts as selling agent for such material or articles.

The engineering department considers all patents and

inventions submitted to the company for purchase, to determine whether they contain matter which is of interest to the company from a physical and engineering standpoint.

The engineering department prepares for the patent attorney, full and complete descriptions of all inventions made within the department, which may contain ideas of patentable novelty.

The engineering department considers the drafts of all patent applications to insure that they are correct from a physical and engineering standpoint.

The engineering department takes all necessary steps to insure that all questions concerning the company's freedom to furnish such apparatus have been presented to the patent attorney for consideration before final manufacturing authorization is placed in the general manufacturing department, or with outside suppliers.

The engineering department prepares inspections specifications for:

- (1) Material manufactured or repaired by the company.
- (2) Material furnished but not manufactured by the company.

The engineering department is responsible for the quality of the apparatus manufactured or repaired and systems installed by the company.

The engineering department inspects such quantities of the material manufactured or repaired by the company as may be necessary to insure that the material will meet the requirements of customers and the prescribed standards of design.

The engineering department inspects material furnished but not manufactured by the company in order to insure that the material or articles furnished under such arrangements, meet specifications covering material or design of articles that have been approved by the engineering department.

The engineering department investigates all complaints with reference to quality and determines the responsibility for defective material furnished by the company.

Military Experiences Abroad

A very entertaining talk, which touched on many topics, was given by Lieutenant-Colonel Holman James, of the British Army, at the Montreal Co-operative Electrical Luncheon on May 11. Lieut.-Col. James related incidents in his military experiences in South Africa and in France; his association with the Commission of National Service in London; and also his experience ranching in Western Canada. Speaking of his travels in the United States, Lieut.-Col. James alluded to the opportunities he had of testing the real feeling of the country toward the British people. He had found, he said, that there was lots of good feeling and amity in the depths of the American heart responsive to everything honestly calculated to stir it in their fellow Anglo-Saxons in other parts of the world. Indeed, he suggested that an improper national consciousness in the Britisher, resident in the United States, unwilling to accommodate itself to the sentiment of the country in which their living was found, was sometimes responsible for "turning the edge" of an otherwise happy relationship. Altogether he thought it was a pity that the average Englishman did not know the American better than he did, for it was through this growing acquaintance that the feeling already existing might be brought to its fullest and best fruition, in mutual recognition they liked each other all the time and did not know it.

Gas Producer Plant for Maritime Electric

An interesting producer-gas installation was recently installed for the Maritime Electric Company, Charlottetown, P.E.I. This was a 500 h.p. unit, manufactured by the Akerlund & Semmes, Inc., of New York. The producer is operating on Nova Scotia bituminous coal, and was installed in 1917. The plant furnishes current to the municipality and inhabitants for light and power. The fact that it has given the utmost satisfaction in reliability and economy during this interval is evidence of its practicability.

The following are typical results obtained from the Maritime Electric Co.'s operation log:—

24-hour Test Covering Minimum and Maximum Loads

Watch	KW.	Lbs. Coal	KW. per hr.	H.P. per hr.	Lbs. Coal per KW.	Coal per H.P.	Coal per hr.
8-4	1000	2600	125	167.5	2.6	1.9	325
4-12	1220	3144	152.2	204.3	2.5	1.8	393
12-8	410	564	31.2	68.6	1.3	0.97	70.5
24 hrs.	2630	6308	106.2	142.3	2.5	1.8	262.3

Average of seven tests, consisting of six series of eight hours each, and one of seven hours. Fifty-five hours:

3490	3978	63.4	84.9	1.1	0.85	72.3
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Note:—Tests made after adjustments to plant, following the first noted 24-hour test. Ashes removed during 24-hour test were about 800 pounds.

Coal used: Lingan Seam, Dominion Coal Company, with following analysis:—

Fixed carbon	55.5
Volatile	38.6
Ash	5.9
Sulphur	2.4

B.t.u.'s 14,000

The above tests were taken in the spring of 1920, since

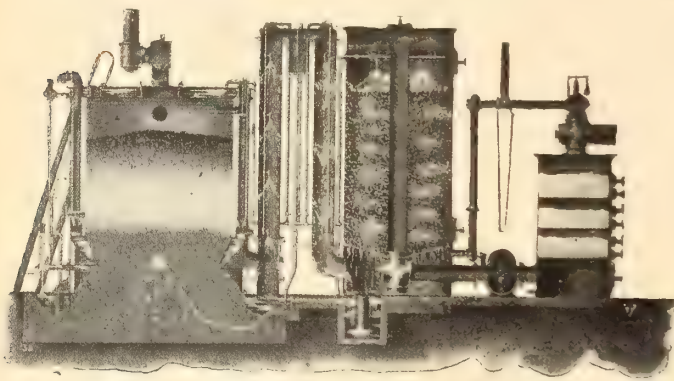


Diagram of Producer Unit

which date the plant has been operated at a forty per cent. overload. At times it has been necessary to operate at only fifteen per cent. of rated capacity, under which conditions it has been found possible to maintain a fuel consumption of two pounds of coal per horsepower per hour.

We are indebted to Mr. H. E. Widmer, of Lacombe, Alta., for the information regarding this plant. Mr. Widmer is western representative for the manufacturers and has been instrumental in placing a number of these plants in Canada. The company advises us that the Simonds-Canada Saw Company, of Montreal, have been operating two Akerlund gas-producers for about seven years and have recently installed a third unit.

They point out that there are large deposits of lignite in Canada of such a grade that it is unsatisfactory for steam boilers. It is, however, claimed to be quite satisfactory fuel for these producers, the consumption of lignite being almost in direct proportion to the B.t.u. value per pound of the lignite compared with 13,500 B.t.u. for bituminous coal. The

advantages claimed for this down-draft type gas producer are tar-free gas from bituminous coal, lignite or sawdust, with which is associated economy, reliability, flexibility, and simplicity in design and operation.

Had a Good Time at the Coast

Returning home from a visit to several of the principal cities between Winnipeg and Vancouver, Mr. J. Gordon Smith, general manager of the Great West Electric Co., Ltd., Winnipeg, expresses himself as highly pleased with the business outlook for the season. Accompanied by Mr. J. W. Wheatcroft of the same firm, Mr. Smith visited Saskatoon, Edmonton, Calgary and Vancouver, spending some ten days in the latter city, and while there appointed the B. C. Electric Company exclusive distributors of the Eden Washer, in Vancouver. The Great West Electric Company handle the Moffat Range, Laco lamps and many other well known lines, all of which are now being distributed by prominent electrical dealers in the cities visited. While in Vancouver Messrs. Smith & Wheatcroft were guests of E. E. Walker, sales engineer of the B. C. Electric Company at a Rotary club luncheon and also of J. B. Ormsby, Pacific Coast representative of the National Carbon Company, at the luncheon given by the Vancouver Electrical Association.

Business conditions at the Coast city are indeed promising, said Mr. Smith; "in fact our entire trip has been most satisfactory. The crops in the districts we covered gave every indication of turning out splendidly, and I was struck by the general optimistic note prevailing everywhere we visited."

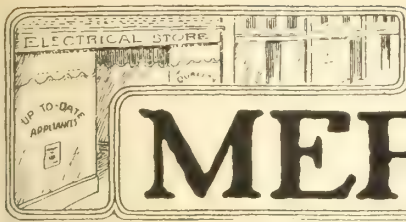
Believing that one good turn deserves another, Mr. Smith is looking forward to the time when the Vancouver electrical men visit Winnipeg, in which case he says "it won't be my fault if we don't give them as good a time as they gave us."

The Star Electric Co., Ltd., 185 Lombard Ave., Winnipeg, has been awarded the contract for the electrical work on the Deaf and Dumb Institute, Tuxedo, work on which will be started immediately.



Mr. F. J. Pratt

Chairman Entertainment Comm. Manitoba Electrical Association



BETTER MERCHANDISING



How to Land Your Prospect

The Selling Game Requires Confidence, Earnestness and Hard Work

By Thomas Howard before California Edison Co.

How to "land" prospective customers is an interesting subject for every salesman. This article deals more particularly with the sale of securities of a central station company, which are widely distributed among their customers, but it contains a variety of useful hints which may be copied to good purpose by any man who has something to sell and has confidence in his product.

Mr. Howard was recently addressing the district managers of his company on the best methods of closing sales. He asked "What is the method of procedure when a man goes fishing or hunting?" He knows that there is game or fish to be had. First, he gets down the gun, he caresses it lovingly, he polishes it, he swabs it out, he oils it. Then he gets cartridges, he packs his grub, and he talks to anybody who will listen to him about the places to hunt, and he grows enthusiastic. He is ready and willing to walk a good many miles? For what? To bring down his game. He has an object. That is what I want to impress upon all here; that to succeed in any line of endeavor you must have an object. You must have earnestness. You must have confidence in your ability, confidence in the thing you are selling—and confidence begets earnestness; and with confidence and earnestness and the right kind of goods you will succeed.

Fishing for Prospects

There are a good many ways of developing prospects, but there is one sure way. That is, make a start. Approach someone on the subject that you are interested in, approach a dozen people, and I will guarantee that you will get enough information from the dozen to give you prospects, and so on ad infinitum. I will also tell you something else, which is this: that there is a law which is called the law of average. It may be 1 to 10, but it is sure and unfailing. It works something like this: you may call on fifteen people and make one sale, but you will surely get two out of twenty. You try it. According to your earnestness and your ability as a salesman, the average may be higher than I have mentioned. It means hard work and what we call stick-to-it-iveness, and if you do not make a sale in the first 10 or 15, stick to it. It works!

In the selling game a salesman must know something about his goods. In fact, the more he knows about them the more he can increase his average.

Now a fisherman gets his rod and reel; he gets the right kind of hooks, and the proper kind of bait for the kind of fish he is after. How careful he is to put the bait on the hook in a manner that is inviting to the fish! Then he throws in the line. After a while he gets a nibble. How earnest he becomes! He loses it! It was a big one! Does

he quit? Not if he is any kind of a fisherman. He tries again; a nibble—a bite. He lands it! How quickly he baits again! He is beginning to get interested and he stays with it. That is the thought I want to impress upon you—that you keep on throwing in your line; the fish are there. They are hungry; they will nibble; they will bite; and according to your perseverance will be your catch.

The Right Method of Approach

In soliciting prospects, the main thing to avoid is the negative answer. Frame your questions in such a way that they will require an affirmative. Do not say, "How would you like to purchase some Edison stock today?" The word "stock" is like a red rag to a bull, to some people. I like the word "securities" better. Just assume that they ought to have some shares—something like this: "My name is Blank from the Southern California Edison Company. We are with the approval of the Railroad Commission putting before the people, a new issue of securities, bearing a very attractive rate of dividends; in fact, this is an A-1 investment bearing 8% on par or on actual investment about 8.51%." It is just like any other battle—get in the first lick if you can. Get it into his mind that it is a good thing for him. Tell him that Jones of the Bank has got a bunch of it, or any other person that is supposed to be shrewd, and finish up by inviting questions. You will find that the average person requires a little shove; in fact, we all like to be coaxed a little even if we are intending to invest. Put the personal equation to the front—they have the money and the Edison Company wants it, and if you want a thing bad enough, you will generally get it; and while the advertising that this company sends out is a mighty good thing, sometimes the idea created by this advertising lies dormant in their minds until they are approached by a representative of this company.

You have no doubt heard of "Old Scar Face," the old antlered deer that refused to be caught for many years. The old deer was stalked and hunted by experienced hunters. He had seemed to bear a charmed life. Apparently he was hit but always got away. Now, I have an "Old Scar Face" down in the Santa Ana district. I have stalked him and trailed him. I know where he gets his lunch; I have made it a point to spot him a couple of blocks away and then walk towards him. He is conscious that I am after him. He is the kind of man with whom you broach your subject and then let it soak in. I want that prospect worse than any I ever got. I got a good shot at him the other day. He stumbled; he fell; but he got away. I was talking to two prospects on the street before coming to work and "Old Scar Face" said, "When you get through I want to see you." In his quiet way he asked, "What did you say that stock paid?" Did I land him? I did not. But I am going to get him. He might just as well take the hook now as later, because, while I am potting away at other game, I am always looking for "Old Scar Face."

The Three Requirements for the Game of Selling

This game of selling requires three things: confidence, earnestness and hard work, and results will surely follow. All the world is a prospect, so I would say to you, "Go after them."

The most amusing experience that stands out in my memory in selling Edison securities was on the last active campaign. I was talking to the proprietor of a furniture store who already had some shares—and he is some booster, believe me. While we were talking he said he knew a man who he believed had some money lying idle. He called him on the phone and asked him to come down to the store. When the man came he asked the usual questions, then said he would take a few shares. I said, "All right, let's go over to the bank and you can draw your check." He replied, "No, I have the money. Wait here while I go and get it." In a few minutes he was back and when I saw what he had, over \$1500 all in greenbacks, 5's, 10's, 20's and 50's, oh boy! I was so nervous I could hardly count it, and when it was rolled up I could hardly get it in my outside coat pocket. I saw him again a few days ago and he is expecting to sell a ranch; and if he does he will come through again.

In referring again to the ways of getting prospects and the methods I use, I will say, "If the mountain will not come to Mohammed, Mohammed must go to the mountain." So,

on Saturday afternoon off, I borrowed a bicycle. You may know that in Santa Ana when you want to go anywhere you cannot get on a street car and ride easily to just where you want to go, as such transportation is limited. So Tommy pushes his little Ford—and sells 53 shares to five different people.

Evenings, when the fireside and evening papers are attractive, I have been making calls and getting results, or laying foundations for future results. I want to tell you now that your efforts are not altogether lost. They crop up sooner or later and your talk about your company is good propaganda.

Things are not always pleasant, though. One evening I went out and it seemed that the harder I worked, the less I accomplished.

In conclusion, let me repeat,—confidence in yourself and in what you are selling; earnestness in your talk as to its merits; and hard work in making calls—and the greatest of these is hard work. The fish are there, the game is there; the prospects are there. They have the money.

Electrical Devices and the Average Woman

Don't Take it for Granted That She Knows the Whole Subject As Well as You Do

By C. L. Ketchum*

"I saw a window display this evening full of various electric devices. It was a sort of hodgepodge, but interesting. The floor and walls were beautifully clean, which is more than you can say for the place across the street, as it is mostly chuck full of lamps. The window had a washing machine in the centre.

"The current was turned on and the soapsuds were splashing up and down a circular rod of some sort. I knew it was a washing machine because there was a rubbing board attached at the upper right hand side. I don't know how much it cost or the name of it. A placard said it was eight dollars down and ten dollars a month, but it didn't say how many months. A man passed by and asked: 'Does that wash things?' and I told him it did. I knew more than he did, anyway.

"Right in front was a beautiful percolator, or at least it looked like a percolator, only it had a spout in front like a soda fountain. Just imagine pouring unlimited coffee out of that lovely urn! It cost thirty dollars, but may be that price included the milk pitcher and sugar bowl and teapot that stood around it in a circle. There were all on a nice mahogany table, and they looked rather queer in front of the washing machine, but they were so bright and shining a lot of people stopped to look at them.

"Down in the corner was a sort of baby range affair with pots on it. I guess it is run by electricity and it must cost a lot. There was a placard inside it that I could only partly read. The price wasn't on it, or the name. If I knew what to call the thing I might have gone inside and asked questions, for it looked awfully interesting, just what I want in my new home, but how could I tell him what I meant unless I brought him to the window and pointed? Anyway I can't buy now and I wouldn't buy until I had seen a number of different kinds and knew how to choose. There are lots of vacuum cleaners and some aren't any good at all. You get the dirt all over the floor trying to get it out of the machine.

"I wish I knew the names of the different motors I saw on the floor and the dearest little curling iron was tucked

in something that looked like a flatiron stand. They could just as well as not have put the name on that. The price was tucked in some way so I couldn't read it though I looked at all angles. And there was the dearest baby lamp, with a little eye shade thing on top, and a big tall lamp, something like the one I saw down town. I wonder if it is the same price. Believe I like this one the best. No, I haven't time to go in. I pass this window every day anyhow, and I'll go in some time maybe and ask the names of things.

"And I love that washing machine. It looks so nice and sudsy as though your clothes just had to get clean, but I don't think I'd have to use that washboard. Or was it a washboard? Perhaps it was just a wringer. There were so many things in the window I can't remember. But they all looked so efficient, just what I want. I'd a whole lot rather not have a servant, but do my own work and buy all the labor saving devices. I suppose prices vary.

"There were flat irons too, but they were different sizes. I wonder if they all belonged together, and were some cheaper than others, and how do you know when to take them on and off? I simply must go in and ask questions, but I don't know where to begin, and I don't even know what it is I want to ask about."

The above is a sort of condensed report of a real conversation. The woman in question may be a little more helpless, a little more ignorant, and a little more timid than the average, but it is safe to say there are numerous women like her. Note that her chief grievance wasn't that there were so many objects in the window that she couldn't make up her mind what she wanted. She practically wanted everything she saw and was shortly to do considerable buying along this line.

Had the store in question had a neat placard above every article in the window, giving in clear letter the name and the price, she would have had something definite to go by. If she wanted to ask questions she would at least have known the name of the article she wanted to ask questions about, and she would have known whether the price was at all within her means. Also while a price may be standard women like to compare prices anyway.

*In Electrical Contractor-Dealer.

There is nothing whatever to be lost by having a price tag visible. A few may be scared away by the price, but if women want time saving devices at all, they are going to buy them price or no price. If their means are limited they will save up and buy gradually. But they will buy at the store which makes it easiest for them to buy.

All Strange to Her

The average woman is not at home in a store selling only electric devices. She is or feels as helpless as a man in a millinery store trying to buy ribbon to match his wife's hat. But the milliner knows the man is helpless and she acts accordingly, and the man knows she will give him the right ribbon at the right price.

The woman shopping for electric devices knows only that she herself doesn't know anything; that she does not want to buy just yet; and that she hasn't the courage to let the salesman get hold of her, talk for half an hour, and then turn and walk out of the store.

Another thing: If the articles displayed in the window are described in booklets, it would be a good idea to have the booklet attached by a small cord to the article along with the price tag. Most any woman, no matter how busy, how timid, or how uncertain about buying, can and invariably will enter the store, give the name of the article or articles she is interested in, ask for the booklet, and leave. Once she has read the booklet and feels that she can ask intelligent questions, she won't be so hesitant about entering the store and listening to the salesman.

Motor Starting Switches

The Square D Company has recently designed and marketed a new series of motor starting switches. The outstanding feature of these switches is a cam actuated mechanism on the switch handle, which keeps the switch blades definitely in either the "on" or "off" position. It is impossible to throw the switch partly on or partly off, even for a short space of time. Full positive contact is always made when the switch is thrown on. Full break distance always is established when the switch is thrown off. All current carrying parts are mounted on separate insulating units. Any unit can be easily removed from the front without dismantling the switch. The weight of this type of base is about one-half that of the ordinary slate base. These switches are of the single throw type. When the handle is thrown in the "on" position, the starting blades bypass the fuses, then the running blades makes full contact. Releasing the handle when the motor is up to speed, releases the starting blades, leaving the switch in fused running position. All terminals are located near the top and bottom of the switch where they are easily accessible. Square D Switches are distributed by the Northern Electric Company at their various branches between Halifax and Vancouver.

Telephone Association of Montreal

The following are the officers for 1921-22 of the Telephone Association of Montreal: Patron, Mr. L. B. McFarlane; hon. president, Mr. C. F. Sise; hon. vice-presidents, Messrs. W. H. Black, P. A. McFarlane, W. H. Winter, R. F. Jones, E. Palm, H. E. Scott, W. G. Slack, N. M. Lash, J. N. Groleau, O. E. Stanton and F. G. Webber. The members of the executive board are: President, C. S. Walker; first vice-president, P. L. Smith; second vice-president, N. Knight; general secretary, Miss A. Shill; corresponding secretary, Mrs. E. W. Banks; financial director, A. E. Stanfield; social director, C. Page; sports director, W. L. Smyth; educational director, T. H. Nicholson; musical director, S. B.

Farbstein; dramatical director, W. Farthing; publicity director, J. A. McGuinness; plant chapter chairman, T. Wild; auditors, D. M. O'Sullivan and A. Walker.

New Dead Front and Rear Switchboard

A radically new type of switchboard, manufactured by the Krantz Department of the Westinghouse Electric & Manufacturing Company, provides complete safety to the operator. There are no exposed contacts of any kind, either front or rear, nor is it possible for the operator to reach live parts under any circumstances without dismantling part of the board. These boards are suitable for any capacity up to 600 amperes, 250-volt direct current, and 1,000 amperes, 600-volt alternating current. They may be equipped with any number of switches, circuit breakers, meters and other switchboard instruments, and are applicable for hotels, office buildings, theatres, industrial plants, and for marine work. The board can be made up of any desired number of panels, each of which consists of a heavy sheet steel front, which is finished to resemble slate and is mounted on angle iron supports with cross beams to make the construction rigid. Openings of the proper size are provided in the front and into these switches and other instruments are accurately fitted and supported by angle irons in the rear. The switches are of the Krantz auto-lock type with all of the safety features retained. Each switch is in a separate compartment and is operated by a handle which projects through the cover but is always dead. A door gives access to the fuses but it is interlocked with the switch and cannot be opened unless the switch is in the off position and all accessible parts are dead. The switch cannot be closed while the door is open. In addition to the fuse door, each switch has a cover which is held in place by screws. The removal of this cover gives access to the bus-bar connections and switch mechanism for inspecting the switch contacts, for making load tests of motor circuits without interrupting the service, and for renewing or repairing the switch. All parts are removable from the front. The bus-bar connections are made through studs which connect with the stationary switch contacts. Because of this construction there is little need to go behind the board and the rear projection is small, so that it can be placed very close to the wall. Suitable pull boxes can be provided at the top or the bottom of the board if required.

Broadcasting Market Reports

The test made by the Bureau of Standards, Washington, D.C., of the Westinghouse radiophone has been reported satisfactory, and as a result a service has been inaugurated whereby the U. S. market reports will be sent broadcast through the Westinghouse radio telephone station, KDKA, at East Pittsburgh, each evening except Sunday, at about 9.30, on a 330 meter wave length. On Monday, Wednesday and Friday evenings, added to the Chicago live stock report will be the hay and feed report, and on Thursday and Saturday evenings, the grain report. Also on Tuesday, a potato or other fruit or vegetable report will be given. It is possible that farmers within a distance of hundreds of miles of East Pittsburgh will learn of the agricultural market conditions and prices immediately after the closing of the market.

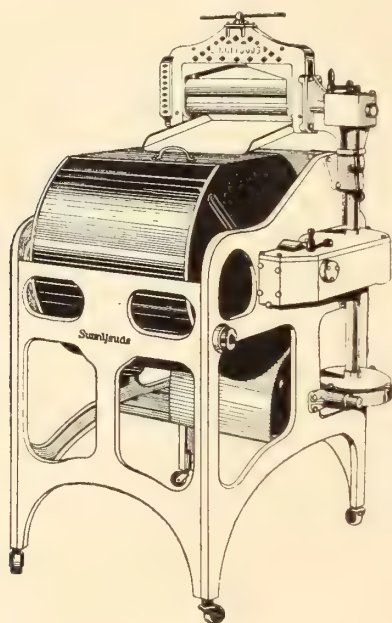
Has Order-taking Ways

Capt. Reg. T. Smith, Western representative Benjamin Electric Company, recently made a trip from Winnipeg through to the Coast. They say he has that same "taking" way with him that he had when covering the Eastern territory, and that as a result of his trip the Toronto factory is working overtime to free the Western orders.

The Newest In Electrical Equipment

The Onward Manufacturing Co., Kitchener, Ont., have added to their line of electrical appliances, the Sunnysuds electric washing and wringing machine. This machine is now being manufactured in Detroit but will now be made up for the Canadian market by Mr. Witzel's company under the name of the "Onward Sunnysuds" washer.

This machine is of the oscillating type, with a capacity for six sheets. A special feature is the construction of its frame. Instead of an angle iron supporting skeleton the cabinet is pressed or stamped out of heavy steel, so stamped that each section is rigid. This enables the manufacturers to effect a considerable saving in manufacturing costs. The



The Onward Sunnysuds

machine is white enamelled. The tub is constructed of heavy copper and carries deep corrugations in the bottom which act as agitators as the tub oscillates. The machine is equipped with a $\frac{3}{4}$ h. p. ball bearing motor connected with the line shaft to the driving mechanism, which is completely enclosed in grease. The operating levers controlling the oscillator and wringer are both placed on the right side of the machine. The illustration herewith shows the construction of the machine in detail. It is now ready for the Canadian market and, we understand, will sell at a popular price."

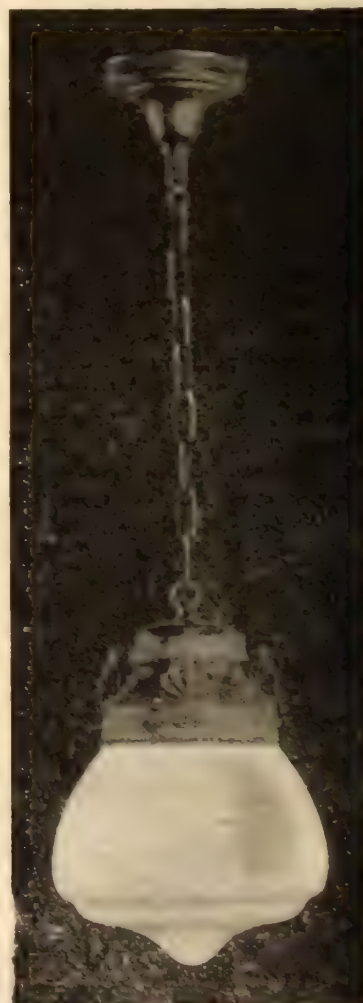
Vancouver Rates Revised

Charges to be made for transportation, gas, electric light and power were taken up at a recent meeting of the Vancouver city council and representatives of the B. C. Electric Railway Co. Cost of street railway transportation was fixed at a sum not to exceed 7 cents for one fare or 25 cents for four tickets for adults, or 25 cents for ten tickets for children, with transfers allowed as at present. Cost of electric light, power and gas is to be increased, with a proviso as to fuel gas for domestic purposes that there is to be a minimum charge of 50 cents per month per meter connected.

The Canadian Ironing Machine Company

The appreciation of the merits of the Ironing Machine for the solving of the problems of the ironing day, and the demand for it in Canada has warranted the forming of The Canadian Ironing Machine Company for the manufacturing of the Simplex Ironing Machine in Canada. Its factory is located at Woodstock, Ont. This makes it possible to offer this popular appliance, which is successfully used in over a hundred thousand households in the United States at approximately the same prices that prevail in America. The use of this appliance means the eliminating of expense, and the saving of health, strength, time and energy. The iron can be had to heat with either gas, gasoline or electric. The 42" and 46" sizes are most popular for household use, and the 48" and 56" for hotel and institutional use. The cost for fuel and operating is small; gas consumption from twenty to thirty-three cubic feet per hour, electric current from three to six kilowatts at high heat, to one and two at low heat. It can be had to operate with motor attached or with belt power, to be used in connection with wash machine motor, or gasoline engine. The day is not far distant, we hope, when the use of the ironing machine will be just as general for the solving of the problems of ironing day as the electric wash machine is for solving the wash day problems.

Harry Alexander, Ltd., 6 King St W., has secured the contract for electrical work on a building to be used for the manufacture of woolen goods which is being erected at 1067 Ossington Ave. for Messrs. Aked & Co., Ltd., at an estimated cost of \$100,000.



A Jefferson Design — A Pleasing Variation

A Graphic Demand Meter

It is generally recognized that the cost of serving a power customer is affected by the power factor of his load, and rates are now being put into effect which take the power factor into account.

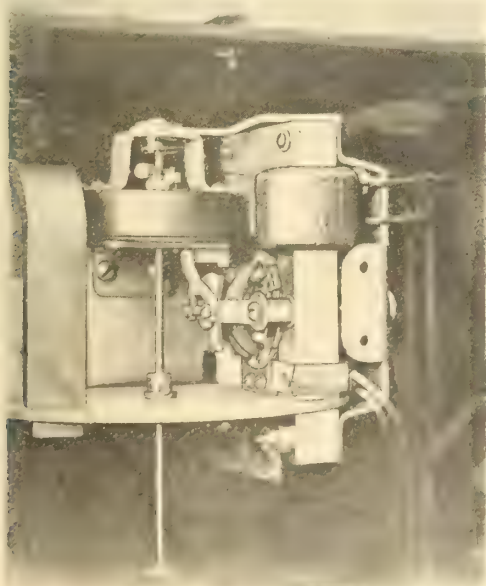
The insistent demand for a k. v. a. meter has arisen from the fact that it is mainly the "investment" or "readiness to serve" cast which is affected by power conditions, so that the demand charged should be based on the customer's maximum demand measured in kilo-volt-amperes. The k. v. a. meter makes this possible.

On account of the great demand for a k. v. a. measuring



New Kva Meter

instrument, many electrical instrument manufacturers have been working on this problem, and the Esterline-Angus Company, of Indianapolis, Ind., announce that they have succeeded in producing a simple, practicable k. v. a. instrument, which is now being placed on the market. This instrument is of the induction type, and can be made in the graphic, integrating, indicating or interval-demand type. The graphic has been developed first. The measuring element is shown in the accompanying illustration; it is about the size of the element of a polyphase wattmeter. Each



The Measuring Element

single phase element consists of a pair of laminated poles, carrying exciting windings, between which is pivoted a small armature which maintains a fixed phase relation between the magnetic field produced by the current winding and the field produced by the voltage windings.

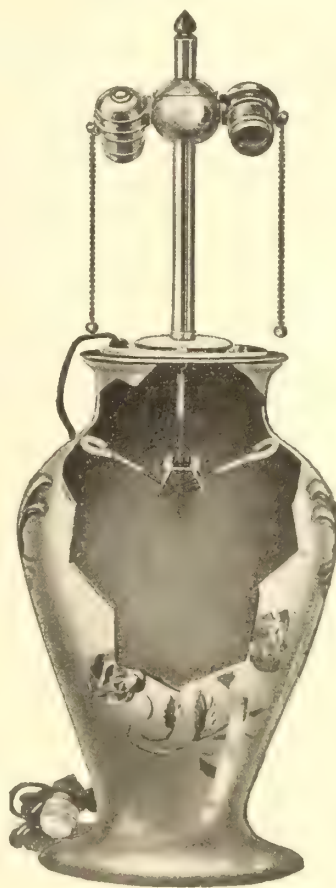
The scale is uniformly divided throughout; the instrument is equally accurate throughout the entire range of power factor from unity to zero, either leading or lagging. The meter records the true k. v. a. of the circuit, regardless of the degree of unbalance. The three phase instrument indicates the sum of the products of current per phase times corresponding voltage to neutral, which is the true k. v. a. of a three phase circuit.

The accuracy of the instrument is well within the established limits for electric meters, regardless of commercial variations in voltage, frequency and wave form. Meters of this type have been fully developed in the portable, switch-board and wall types, and are now in production for delivery early in July.

The Esterline-Angus Company is represented throughout Canada by the Northern Electric Company, Limited.

Anchor Adapters

A practical and artistic result is obtained by converting old-style reading lamps, or vases,—regardless of shape or size, into electric lamps by the use of electric lamp adapters.



This can be accomplished without drilling holes in the vases or otherwise marring them. An illustration is shown herewith of an open-top vase with an "Anchor" adapter installed, the "anchor arms" pressing against the inner surface of the vase. These adapters are manufactured by Timmerlake & Sons, Jackson, Mich.

The Canada Electric Co., 175 King St. E., has been awarded the following contracts by the Board of Education: telephones for the King Edward and Dewson St. school additions, wiring for the Wilkinson School and the Manning Avenue School additions. The sum of \$2,910 will be paid for the above.

Electric Railways

An Interesting System of Distribution For a Street Railway in Western Canada

A rather novel and interesting system of electrical distribution for a street railway has just recently been completed in a city of Western Canada as a result of a change in management.

When the new management took over the street railway they found the trolley and feeder system completely tied in, except for a few trolley section insulators which were bridged in by a copper wire fuse. The former management had claimed for this type of distribution good voltage regulation and high copper economy. They had also claimed that when a breakdown occurred for five or ten minutes car schedules were less disarranged than when the trolley was sectionalized. As far as locating trouble was concerned the motormen were depended upon to telephone in notice of any breakdowns and to tie up the trolley temporarily with a rope supplied on each car. In outlying districts where the copper fuses were used to disconnect lines which were out of order from the rest of the system, these fuses sometimes blew but more often did not.

As the management had nothing to do with the supply of direct current from the three sub-stations and power house—this being a part of another department—they knew nothing of the trouble which they caused the supply department by having their system tied in. When a short circuit occurred near a station the machine breakers in all the stations had to trip so that a very heavy current flowed into

station breakers. Nevertheless heavy currents flowed into the short and the trolley wire was annealed or burned out for sometimes as much as half a mile. Not much trouble was experienced in locating breakdowns except when underground feeders went wrong. One underground breakdown tied up the system for three hours one day.

When the reorganization took place the street railway

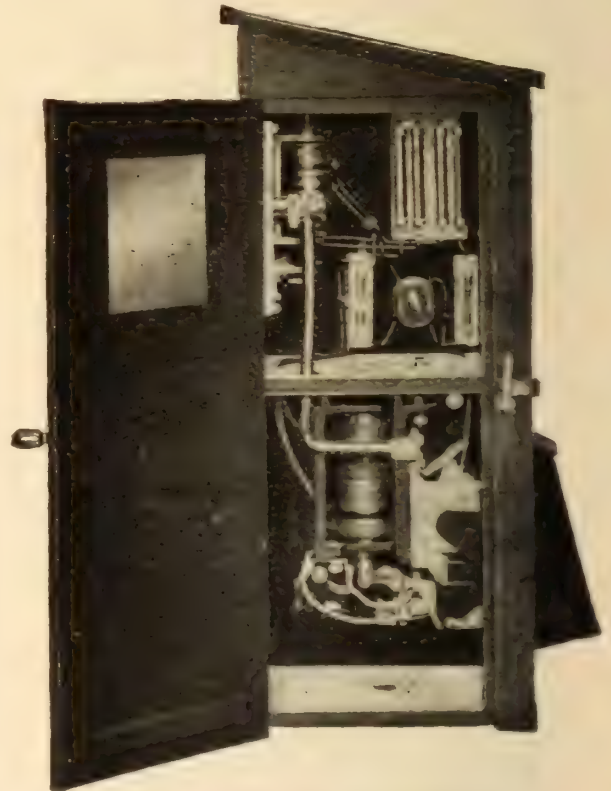


Fig. 2 A side view of sectionalizing switch

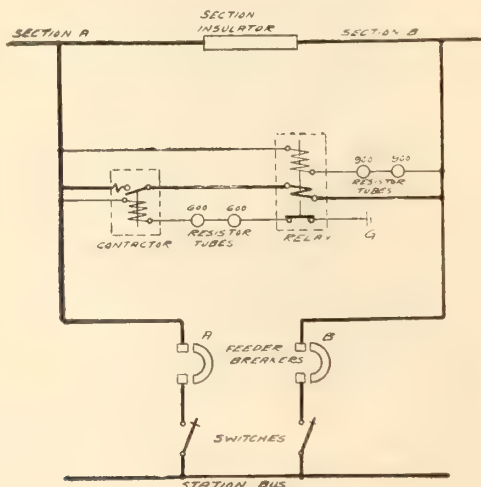


Fig. 1 — Diagram of connections

these shorts, upward to 12,000 amperes. This often had the effect of annealing the trolley wire for a short distance from the short circuit and station breakers were severely taxed. Sometimes flashovers of the machines occurred and considerable damage was done every time a short circuit occurred near a station. When the short circuits happened in the outlying sections the station breakers sometimes did not trip as the resistance of the path to the short was so great that it reduced the current below the tripping value of current for the

system was placed under the same management as the department which supplied the electricity. It was very clear to the new management that considerable improvement could be made to the electrical distribution system. They were ready to admit the good voltage regulation and high copper economy of a tied in system, but the effect of breakdowns on stations and line equipment was increasing to a dangerous point as the system grew larger. A complete tie-up due to a breakdown at some outlying point was no longer permissible. Locating trouble was getting more difficult, so that it was decided to properly sectionalize the trolley system. However, when the matter of feeder copper was investigated it was discovered that the number of feeders was entirely inadequate to supply current for the different trolley sections at times of peak load. This meant an investment of a large amount of money in copper if a properly sectionalized trolley was to be had.

The city has a population of only 75,000 people, but it is spread out like a great many other cities of Western Canada which have passed through a period of real estate inflation. The street railway system, which is a municipal

venture, also suffered as a result of real estate exploitation so that 75 miles of track have been laid for the operation of about 45 cars. Therefore, to run the proper amount of feeder copper to each section to supply peak loads meant long runs of heavy copper which would be comparatively idle for a large part of the day.

The new management finally decided to look about for some method by which a tied in trolley system could be automatically sectionalized in case of trouble. The General Electric Company suggested their S. W. 4 automatic switch. Fig. 1 shows a diagram of the connections.

The operation is as follows:—

If a short circuit occurs on section B, the feeder breaker at the sub-station feeding this section will trip out and there will be a heavy flow of current through the sectionalizing breaker. This current will flow through the series coil on the relay and lift the contactor, open, disconnecting sections A and B. As long as the difference in potential between sections A and B is 50 volts or more the shunt coil of the relay holds its contact disc open and this keeps the contactor operating circuit open. When the short circuit has been cleared the sub-station operator closes his feed switch to section B and the potential difference between sections A and B becomes less than 50 volts. This de-energizes the shunt coil and the contact disc drops thereby closing the contactor operating circuit.

So far as could be learned, a switch of this kind had not been used extensively on other street railway systems. On the other hand, the only objection to it seemed to be that of adding a little complicated equipment which might be a source of trouble.

The switch was of such rugged construction and the results to be expected from it were so promising that 12 of them were purchased and installed in locations which made use of the existing feeder system. Calculations showed that the current flowing into short circuits only had to trip a maximum of one station feeder breaker set at 1,200 amperes and two trolley section breaker sets at 600 amperes each, or a total of 2,400 amperes, which was quite different from short circuit currents of the existing system. The cost of installing the section switches was only \$5,000, whereas a proper feeder system would have cost probably ten times this amount.

With the new arrangement the station operator now reports the location of trouble to the trouble department of the street railway and the whole system is not tied up when a breakdown occurs in any one section. The effect of short circuits is much less serious than it was before and the breakers have provided a general improvement in operating conditions throughout the system.

A Trial of Strength Between Steam and Electric Locomotives

In connection with railway electrification, perhaps the most amazing spectacle that was ever staged was the one set up at Erie, Pennsylvania, on the 7th November, 1919. The General Electric Company manufacture electric locomotives and other electrical and mechanical apparatus at their shops at Erie. They had at that date one of the 3,600 h.p. electric locomotives for the Chicago, Milwaukee and St. Paul Railway ready for operation, and they staged what they called a tug-of-war between this electric locomotive and two of the largest steam engines available. They started off with a tug-of-war between one of the steam locomotives and an electric engine, but the tug-of-war was such a one-sided affair, in the preliminary test, that they then secured a

second steam locomotive. The steam locomotives were in one case the largest passenger engine on the Lake Shore division of the New York Central and in the second case the largest steam freight locomotive available. It was first intended to couple these three engines together, to try to start the electric locomotive off in one direction, and, the two steam locomotives in the other direction; but it was soon discovered that there was so much power in those monster engines that they would pull the drawbars to pieces. They then reversed the idea, and had a pushing contest. A signal to start the three locomotives was given; the steam engineers opened their throttles, and the electric motorman turned on his controller; the steam engines were pushed back along the track as if they were not using steam at all. The steam locomotive engineers protested—claiming that it was not a fair test. They pointed out that a steam engine was at a great disadvantage while standing still while the electric motors could make use of all their available power while standing just as well as while running. In consequence of this protest, the steam locomotive men were allowed to get up a considerable amount of speed,—pushing the electric locomotive down the track. With the three engines so running in one direction, the electric motorman turned on his power with his controller in the reverse position; the two monster steam locomotives with their throttles wide open were brought to a stop and then pushed back as though they were a couple of freight cars! A further test was made. The track upon which those tests were made was six miles long. It parallels the Lake Shore division of the New York Central Railroad along Lake Erie. The three engines coupled together went west on the track about three miles. The three of them, all using power, in the same direction, now returning eastwardly attained a speed of nearly fifty miles an hour. The electric engine was receiving power from the steam power plant which operates the manufacturing works at Erie, and the steam locomotives were of course using their own power. Travelling at a speed of fifty miles an hour, the electric motorman then turned off his power and his locomotive was coasted or pushed along by the two steam engines. While running at that speed, the motorman reversed his controller, that is, he used his electric energy in opposition to the power of the steam locomotives, and, in a remarkably short space these monster engines were slowed down and brought to a stand, and then pushed backwards. While that was an amazing and very impressive spectacle it was just as it should be. The capacity of a steam locomotive is limited to its own ability to make steam. It is a moving power house. Its boiler is limited by its dimensions, by the amount of coal that can be consumed in it by its steaming capacity. The electric locomotive, on the other hand, can draw as much power as may be required from a large stationary power plant—in this case a power plant of 15,000 h.p. Electric railways often receive power from a number of water-power stations and the capacity of these stations may run up to hundreds of thousands of horse-power. O trust I have made that point clear to the committee.—Mr. John Murphy, electrical engineer, Department Railways and Canals and to the Board of Railway Commissioners for Canada, before a special government committee appointed to enquire into matters pertaining to the future fuel supply of Canada.

The employees of the London Street Railway Company who some time ago asked for an increase of four cents an hour at the expiration of the yearly contract, which was refused by the railway company, are now willing to accept the former scale of wages, namely, 48 cents per hour, but the company will not agree to a yearly contract at this figure. The employees have now requested the Department of Labor at Ottawa for a Board of Conciliation to settle the question.

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Used 2	50	3	25	550	720	Westg.	
New 2	35	3	25	550	720	Westg.	
Used 1	30	3	25	550	1500	Tor. & Hm.	
" 2	30	3	25	550	750	F.-M.	
Used 1	25	3	25	550	750	C. G. E.	
New 1	25	3	25	550	715	Lanc.	
New 1	15	3	25	550	1450	Westg.	
" 1	15	3	25	550	750	Lincoln	
" 3	15	3	25	550	720	Westg.	
New 2	13	3	25	550	700	Lanc.	
Used 1	7½	3	25	220	1500	Tor. & Hm.	
" 1	7½	3	25	550	1450	C.G.E.	
New 1	7½	3	25	550	725	Westg.	
Used 1	7½	3	25	550	700	Lanc.	
New 1	5	3	25	550	1440	Excelsior	
Used 1	5	3	60	200	1120	Westg.	
New 3	3	3	25	550	1500	Lanc.	
" 4	3	3	25	550	1400	Westg.	
" 4	3	3	25	550	1400	Excelsior	
Used 1	2	1	60	110	1750	Wagner	
New 2	2	3	25	550	1500	Lanc.	
New 2	2	3	25	550	1440	Excelsior	
" 2	2	3	25	550	1425	Lanc.	
New 1	2	1	25	110	1400	Wagner	
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New 1	1	1	60	110	1725	Wagner	
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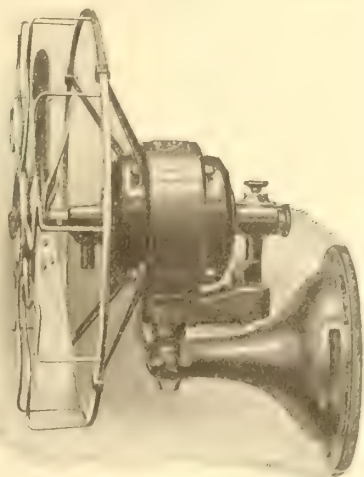
- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
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- 60 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
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 - 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
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- 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
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 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 - 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
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- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
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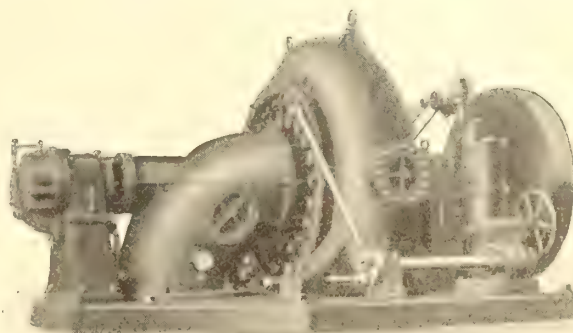
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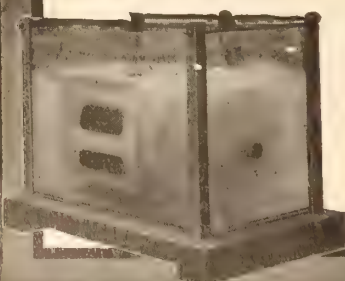
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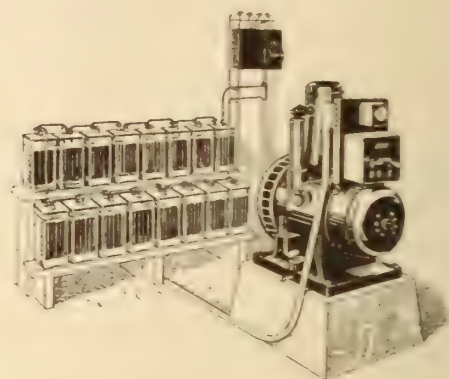
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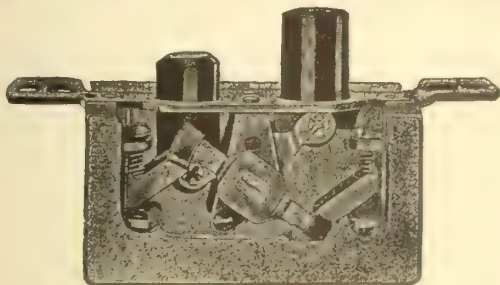
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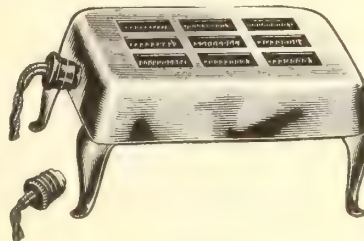
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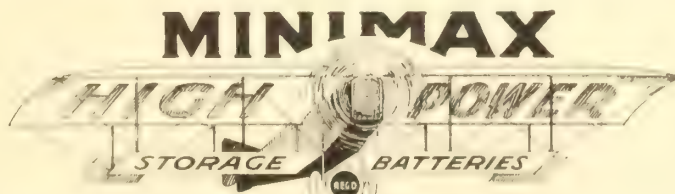
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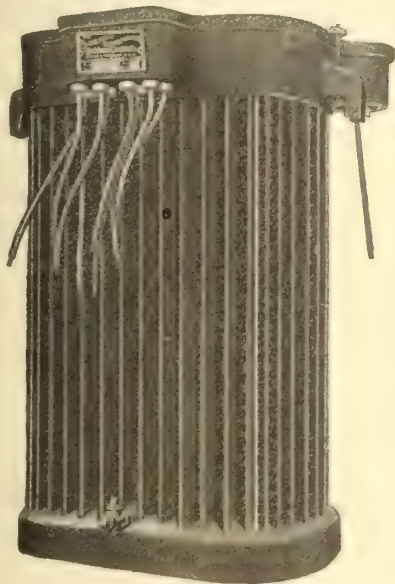


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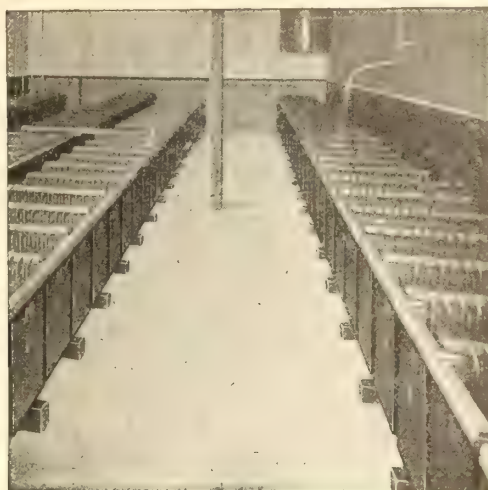
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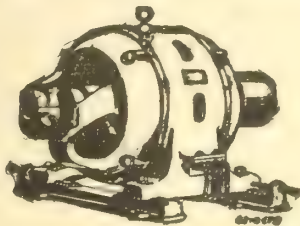
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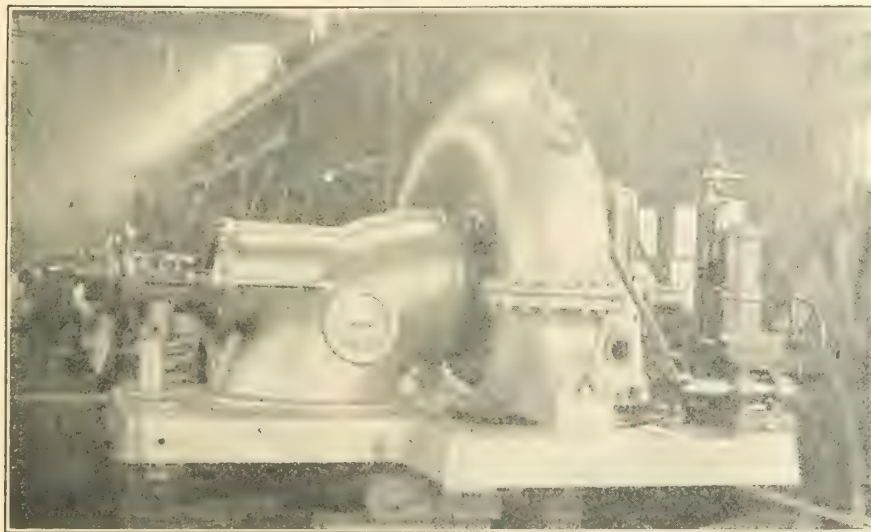
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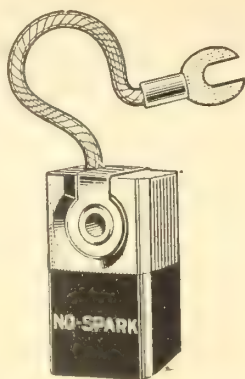
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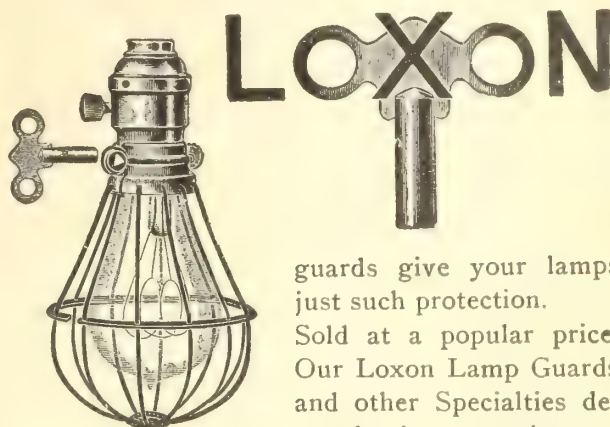
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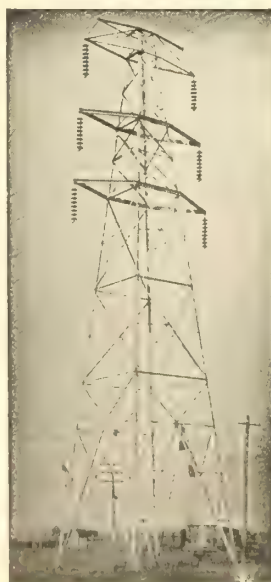


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Walkerville, Ontario, Canada
Structural Steel of all Kinds
Montreal Office in New Birks Building.

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Northern Electric Company

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WRINGERS (Power)

BlueBird Corporation, Limited



BAKELITE DILECTO

In the Big Electrical Shops

Bakelite-Dilecto, the perfect insulation, is extensively used by large manufacturers of electrical equipment and its extraordinary physical properties also permit its use in mechanical applications. We manufacture Bakelite-Dilecto, Vulcanized Fibre and Continental Bakelite in sheets, rods, tubes and special shapes and Contin in sheets or rolls from .005" to .020" thick.

Canadian Agent: Frank T. Groome, 1710 Royal Bank Bldg
TORONTO

The Continental Fibre Co., Newark, Delaware

Pittsburgh Office New York Office Chicago Office
301 Fifth Ave. 233 Broadway 332 S. Michigan Ave.
San Francisco Office, 525 Market St. Los Angeles Office, 411 S. Main St.; Canadian Office, Cor. King & Yonge Sts., Toronto, Ont.

1,200,000

Megohms Resistance
with only
2 Dips of

"OHMALINE"

INSULATING VARNISH

*Exceptionally plastic, flexible, elastic,
oilproof, waterproof, unaffected by
vibration and undue stresses.*

WRITE FOR
BOOKLET E 32

"You Can Trust Griffiths Products"

SPIELMAN AGENCIES, (Regd.)

45 St. Alexander Street - MONTREAL

Ottawa, J. W. Anderson, Bank Street Chambers
Toronto, F. T. Groome, Royal Bank Building
Winnipeg, William A. Gould 39 Charlotte Street
Calgary, Western Supply & Equipment Co.
Edmonton, Western Supply & Equipment Co.

It Can Be Done

QUALITY, LOW PRICES
100% SERVICE

The Ideal Combination

If this appeals to you let us
quote on your electrical
requirements and

WE WILL PROVE IT.

Cassco General Supplies

REGISTERED

MONTREAL

Phone M 302

315 Craig St. West

"PITTSBURGH"



Illustration shows "Pittsburgh"
Reflector No. 100, for 100 or
150 Watt Lamp. Dimensions:
Height 8 inches, width 8 1/4
inches, holder 2 1/4 in. Form "0."

The
Scientific
Show Window
Reflector

It reflects and con-
trols the light to give
the greatest possible il-
lumination to the ob-
ject. The "Pittsburgh"
Reflectors, by scientific
construction and test

give the maximum result from your lighting, and will
pay for their small cost in saving of current. Don't
fail to write for our folder on lighting efficiency.

Pittsburgh Reflector and Illuminating Co.

PITTSBURGH, PA.

Canadian Distributors

JAMES DEVONSHIRE, LTD.

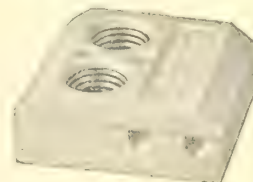
701 Yonge Street,

Toronto

COVERED CUTOUTS

ALL PORCELAIN

No. 61936
D. Pole
Single
Branch



No. 62588
D. Pole
Double
Branch

MANUFACTURERS

DUNCAN ELECTRICAL CO. Ltd.

MONTREAL, - CANADA

Maritime Representative:
F. M. WHELPLEY, Halifax.

Ontario Representative:
WM. F. KELLY, Toronto

Western Representatives:
COCHRANE STEPHENSON & CO., Limited, Winnipeg.

Westinghouse

Type "H" Bus Bar Supports

This line has been developed to meet the growing demand for a superior bus bar insulator, and is the result of years of practical experience with various methods of assembly. The system of tapped steel inserts in special cement was adopted on account of its marked superiority to all clamped or babbitted assemblies, under the most extreme service conditions of vibration, strain, shock, and expansion due to temperature changes.

THE UNITS are of best grade wet process porcelain with highly glazed brown or white finish.

TAPPED STEEL INSERTS are cemented in each end of the porcelain unit by means of jigs, ensuring perfect alignment.

THE TOP AND BOTTOM FITTINGS are of malleable iron, or bronze, and have threaded studs to fit the tapped inserts mentioned above.

CUP WASHERS are interposed between the porcelain and the top or bottom fittings, in order that adjustments may be made without loosening fittings.

ACCURATE MACHINING of all clamp and bearing surfaces assures perfect contact and assembly.

THE MECHANICAL STRENGTH is very large both on bending moment and in tension.

FLASHOVER varies from 3 to 10 times normal rating according to size. Owing to the elimination of clamped fittings on the porcelain, maximum creepage and striking distances are obtained.

INTERCHANGEABILITY. All fittings are absolutely interchangeable, and designed to render assembly and installation as simple as possible. These units are identical with those employed in type "H" Disconnecting Switches, Choke Coils, etc., thus simplifying maintenance problems and making layout uniform.

WIDE VARIETY of combinations to meet all service conditions.

MADE IN CANADA

IMMEDIATE SHIPMENT FROM STOCK



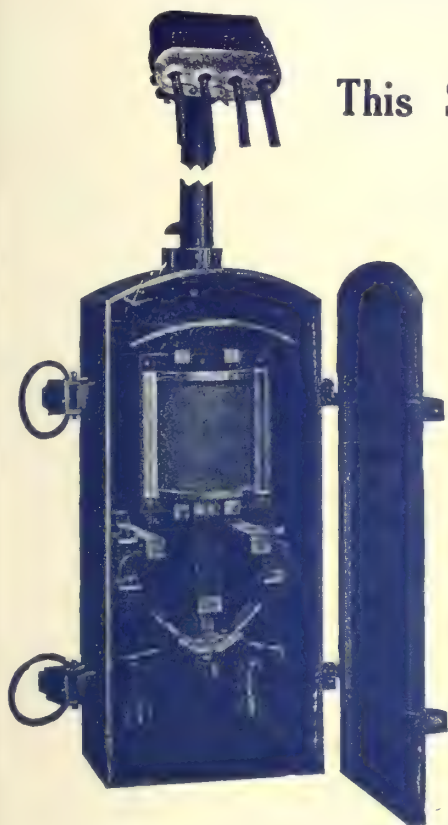
Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.





**This SOLENOID SWITCH has been adopted
by the Hydro Electric Commission**

They use it for

STREET LIGHTING

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

Write for complete descriptive particulars

**The Electrical Maintenance & Repairs
Company, Limited**

Phone
Adelaide
902-903

**162 Adelaide Street West
TORONTO**

Nights
Beach
1723-1930

**Made in Canada
Conduit**

**Electrical Wiring
Made Safe**

Approved by the Hydro-Electric Commission of Ontario
Labelled under supervision of Underwriters' Laboratories

XCELADUCT

(GALVANIZED)

**For All
Electrical
Installations**

**Manufactured by
National Conduit Co., Limited
Toronto**

Sales Agents for Manitoba and Saskatchewan—Filer-Smith Machinery Co., Limited, Winnipeg.

CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

*Manufacturers of High and Low
Tension Porcelain Insulators*

National ELECTRIC RANGES

Better than ever
More popular than ever
If you want good deliveries,
place your order
NOW



Model C6 Range Cat. No. 606

The National Electric Heating Company, Limited

544-548 Queen Street East, Toronto, Canada

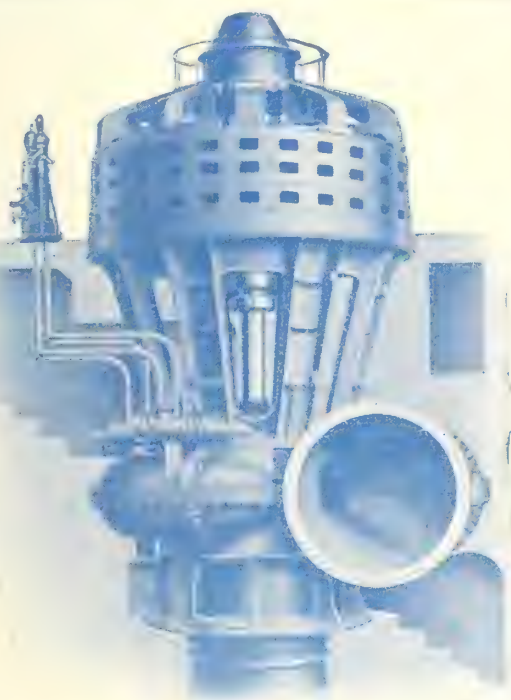
Montreal, P.Q.
209 Mountain St.

Winnipeg, Man.
702 Confederation Life Bldg.

Vancouver, B.C.
627 Vancouver Block.

Electrical News

Engineering Contracting Merchandising Transportation



The Efficient and Dependable Service

in many of America's most notable Hydro-Electric Power Stations can be traced right back to the prime movers, consisting of

SMITH HYDRAULIC TURBINES

If interested in hydraulic development, write Dept. "N" for Bulletin



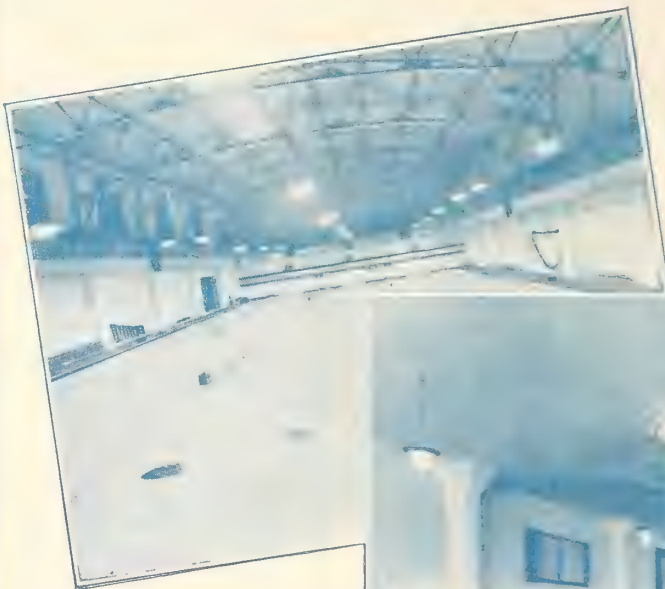
H. B. VanEvery,

Canadian Representative
405 Power Building, Montreal

S. Morgan Smith Co.

YORK, Pennsylvania, U.S.A.

For Better Illumination



Lighting Installation
in St. Andrew's
Curling Rink
Montreal



Lighting Installation
in Windsor Station
Windsor



Brascolites in Cleghorn & Beattie's Furniture Store, Ottawa, Ont.

These Installations solved three problems of Correct Lighting

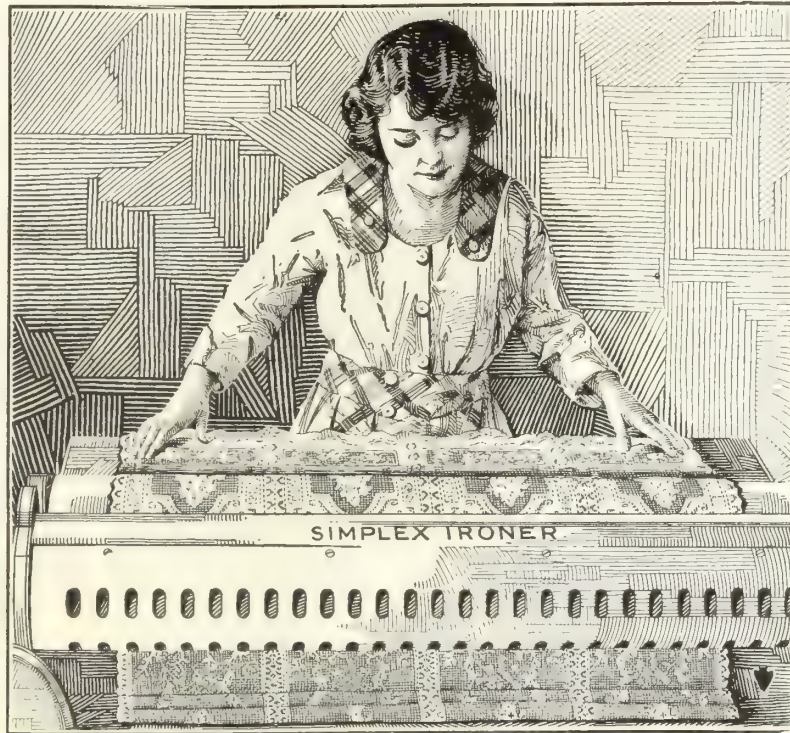
Your territory teems with unsolved lighting problems. Many factories, offices, stores, hotels, churches, theatres and other public buildings are victims of defective illumination. New buildings are constantly being erected. Every lighting prospect has its own peculiarities, to meet which a variety of fixtures are designed. It becomes a question of correct application. Let our illumination specialists assist you in deciding the form of lighting best adapted to your clients' needs.

Write our nearest house.

Northern Electric Company

LIMITED

Montreal	Quebec	Toronto	London	Regina	Edmonton
Hallifax	Ottawa	Hamilton	Windsor	Winnipeg	Vancouver



Saleability

There can be no doubt about the selling possibilities contained in these "Simplex" Ironers.

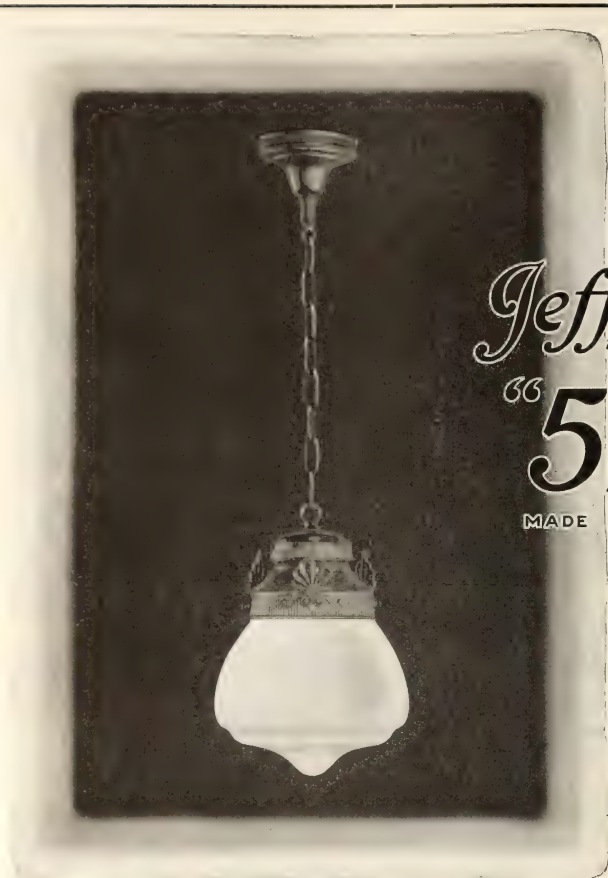
Their splendid construction and high-grade materials insure a long service. And this, together with the fact that they fill a real need, quickly wins over the busy housewife. In addition we render every possible help to the dealer in the way of window cards, folders and newspaper cuts.

It is an opportunity no electrical merchant should overlook. Write and let us send you full particulars. Prices will appeal to dealer and consumer.

Canadian Ironing Machine Co., Limited
Woodstock Ontario

SIMPLEX IRONER

"THE BEST IRONER"



Jefferson
⁶⁶
515"

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A Pleasing Deviation From the Ball Globe

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo glass, with standard 6" fitter. Adaptable for any business lighting.

GET ON THE "515" AND CREATE NEW BUSINESS

*Ask for Our New Booklet of Commercial
Lighting Units*

The Jefferson Glass Company, Limited

Head Office and Factory: 388 Carlaw Avenue
Toronto

Showrooms: 164 Bay St., Toronto
272 Main St., Winnipeg

285 Beaver Hall Hill, Montreal
510 Hastings St. W., Vancouver



The signs
can only warn —
but the barriers
protect

Ebony Asbestos Wood

This is an impregnated form of Asbestos Wood that is probably the strongest insulating base.

It is uniform in composition and can contain no metallic veins. It is light, very strong and easily worked.

Ebony Asbestos Wood far surpasses ordinary switchboard material in dielectric strength and equals the best oiled slate in appearance.

Send for a sample to test.



Through—

Asbestos

and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High
Temperature Cements,
Asbestos Roofings,
Packings, Brake
Linings, Fire
Prevention
Products

A physical protection against thoughtless or accidental contact with electrical apparatus is far superior to any number of warning signs.

This is the one big reason why electrical barriers are used increasingly in station construction. And the necessity for barriers which can cause no hazard through deterioration or structural weakness makes Johns-Manville Transite Asbestos Wood most desirable for this purpose.

For Transite Asbestos Wood is a material of great physical strength and high dielectric strength, it is not liable to warp or crack and it is light and easily worked.

Even if you do believe in signs, you need barriers of Transite Asbestos Wood to protect.

Canadian Johns-Manville Co., Limited

Toronto

London

Montreal

Hamilton

Winnipeg

Ottawa

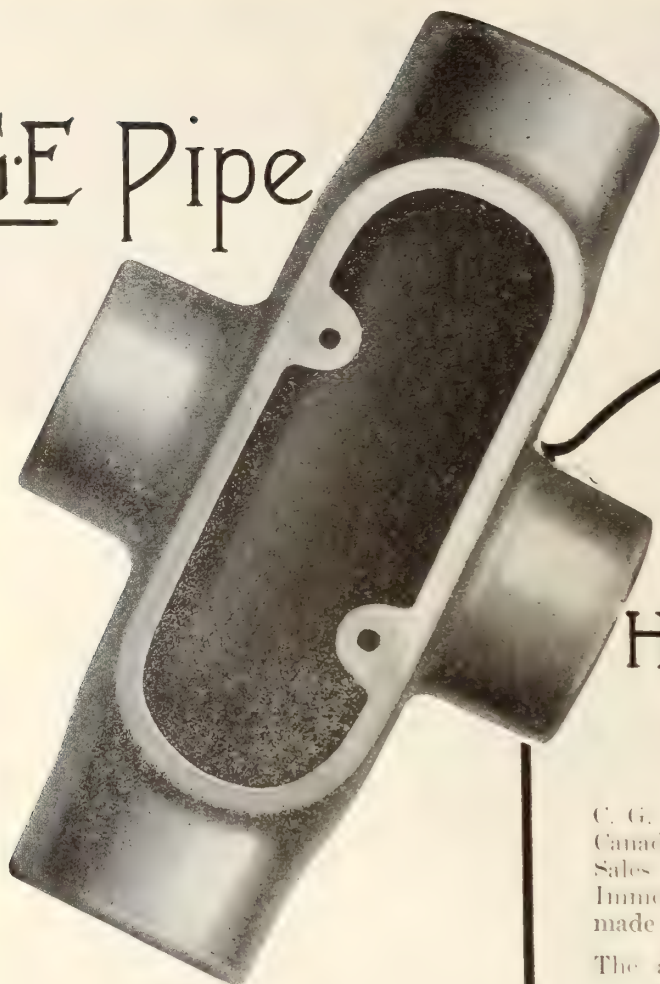
Vancouver

Windsor

JOHNS-MANVILLE ELECTRICAL MATERIALS

C.G.E. Pipe

Fittings



Twenty-Four
Hour Service

C. G. E. Pipe fittings are "Made in Canada." We maintain fully equipped Sales Branches from Coast to Coast. Immediate shipments can be, and are, made from Stock.

The above reasons alone are enough to warrant the confidence that electrical dealers and contractors place in C.G.E. service. When it is taken into consideration that there are ten separate and distinct inspections that C.G.E. Pipe Fittings must pass before they are allowed to be put into stock, it is no wonder these Fittings have such an enviable reputation.

The above features are worth serious consideration when next you order Pipe Fittings.

*Our Nearest Sales Branch
is at your disposal*

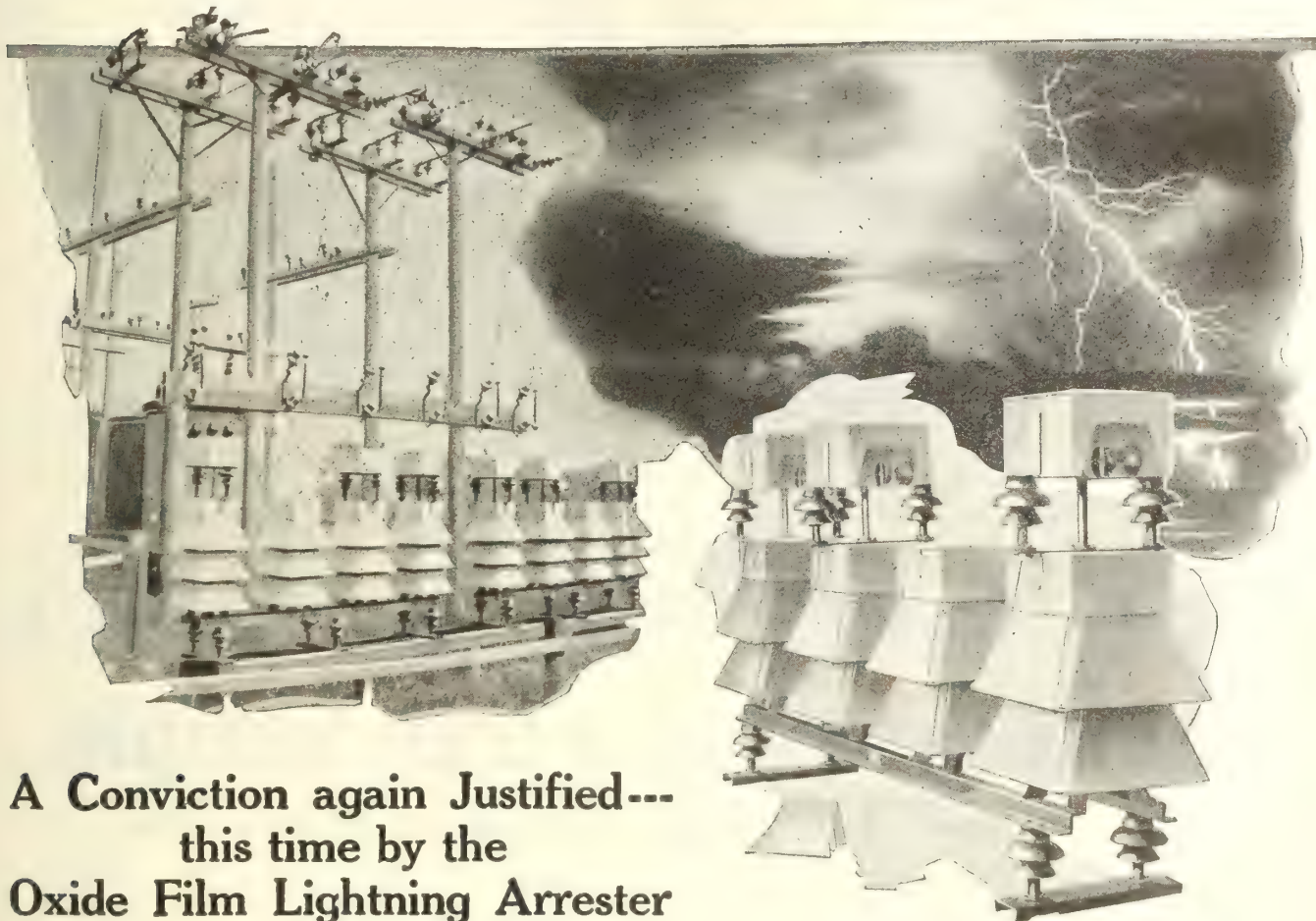
Canadian General Electric Co., Limited

Head Office, TORONTO

Branch Offices: Montreal, Quebec, Sherbrooke, Halifax, Sydney, St. John, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Nelson, Vancouver and Victoria

"Whatever difficulties in future electrical engineering develop from electricity of the atmosphere, it is my conviction that our resources will be extended to meet them"

Elihu Thomson, 1902



A Conviction again Justified--- this time by the Oxide Film Lightning Arrester

THE Oxide Film Lightning Arrester meets the long felt need for an arrester of the highest protective qualities but comparable in operation, maintenance and general construction with other electrical apparatus.

Six years of successful operating experience have demonstrated that the arrester will give protection against lightning and that the design is suitable for the severe requirements of modern engineering practice.

Hundreds of oxide film lightning arresters are now giving protection under all sorts of operating conditions.

Complete information will be sent you on request.

Canadian General Electric Co., Limited

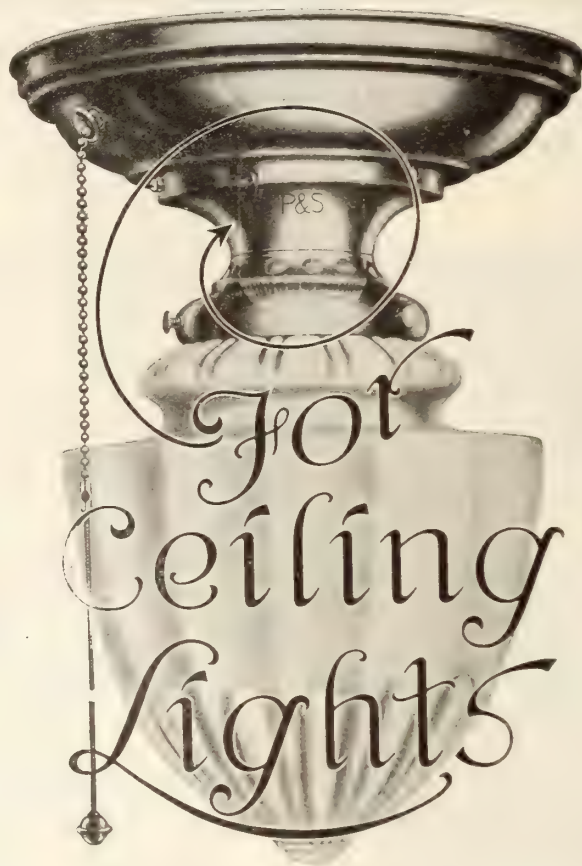
Head Office



TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson, and Victoria.

*The Arrow
Points at the
Receptacle*



*Send for a
Sample of
P&S 998
Now*

Let us send you a free Sample
because these Receptacles are selling at this time

Fixture Men and Electrical Contractors
are Buying P&S 998 and 427



P&S 998

Easy to buy
Quick to use
For Quick Sales

Make a Snappy Bed-room Light
with 998 or 427



P&S 427

*Only a few folders left—
Write today for Ceiling Light Folder*

PASS & SEYMOUR, Inc.
SOLVAY NEW YORK



This is one of the series of striking illustrations appearing in Hoover national advertising. Over six hundred thousand of Hoover full pages are circulated monthly through leading Canadian magazines

What is "The Hoover Resale Plan"?

The Hoover Resale Plan was years ago originated by the Hoover organization. Many of the leading stores in this country and the United States have long operated under it. It has no parallel for achieving a large volume of sales.

Under this plan the Hoover organization is invited into a store where it conducts itself, under store rules, as a part of the store organization.

Trained, however, in the art of securing leads, demonstration, sale and servicing of Hoovers, the Hoover organization seeks and obtains business as only an organization thoroughly schooled in the advantages and features of a product can do.

The plan provides the dealer with such a specialty organization, relieves him of the responsibility for its selection, training and supervision, and, without risk, nets him a greater annual profit on his investment.

Experience has demonstrated that the plan is without an equal for success. The Hoover itself is an integral part of the plan. For there is no other electrical appliance which gives so convincing a demonstration, or serves its users in a more satisfactory way.

The Hoover and the Hoover Resale Plan are gaining every day. Are you willing to consider them now?

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and General Offices: Hamilton, Ontario

The HOOVER

It Beats... as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

"When Dreams Come True"

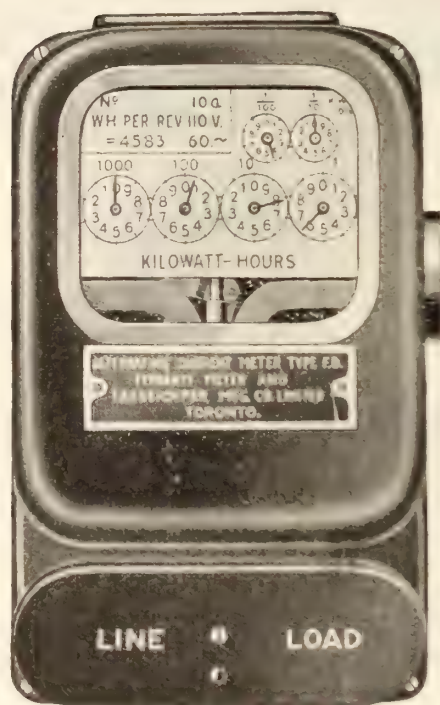
Introducing—THE KID

The Last Word in Meters!

Small, but equal to the job.

Special Features

Light weight, only 4 lbs.
 Portable
 Compact
 Pressed Steel Case and Cover
 All parts easily removed
 Accessibility



SCALE 1/2 SIZE

Type F. D. Integrating Watthour Meter.

Shipments from Toronto Stock. The most up to date meter on the market.

Special Features

Cam Type Self-locking
 Adjustments with Graduated
 Scales for Light Load,
 Full Load and Inductive Load

 No Unnecessary Screws

 Very easily and quickly
 Calibrated

 Wall Fixing Wood Screw
 provided as part of Meter

Ferranti Meter & Transformer Mfg. Co. Ltd.

26 Noble St.
 TORONTO

Northwestern Engin-
 eering & Supply Co.
 CALGARY

128 Bleury St.
 MONTREAL.

Simpson Bldg
 HALIFAX.

145 Market Ave.
 WINNIPEG

 Northern Ontario
 J. P. Bartleman
 Timmins



A Galvaduct Building
DUPUIS FRERES LIMITED
St. Catharines Street, Montreal.

Galvaduct Loricated

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

Always specify Galvaduct or Loricated CONDUITS

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

If your jobber cannot supply you
—write us.

CONDUITS COMPANY LIMITED

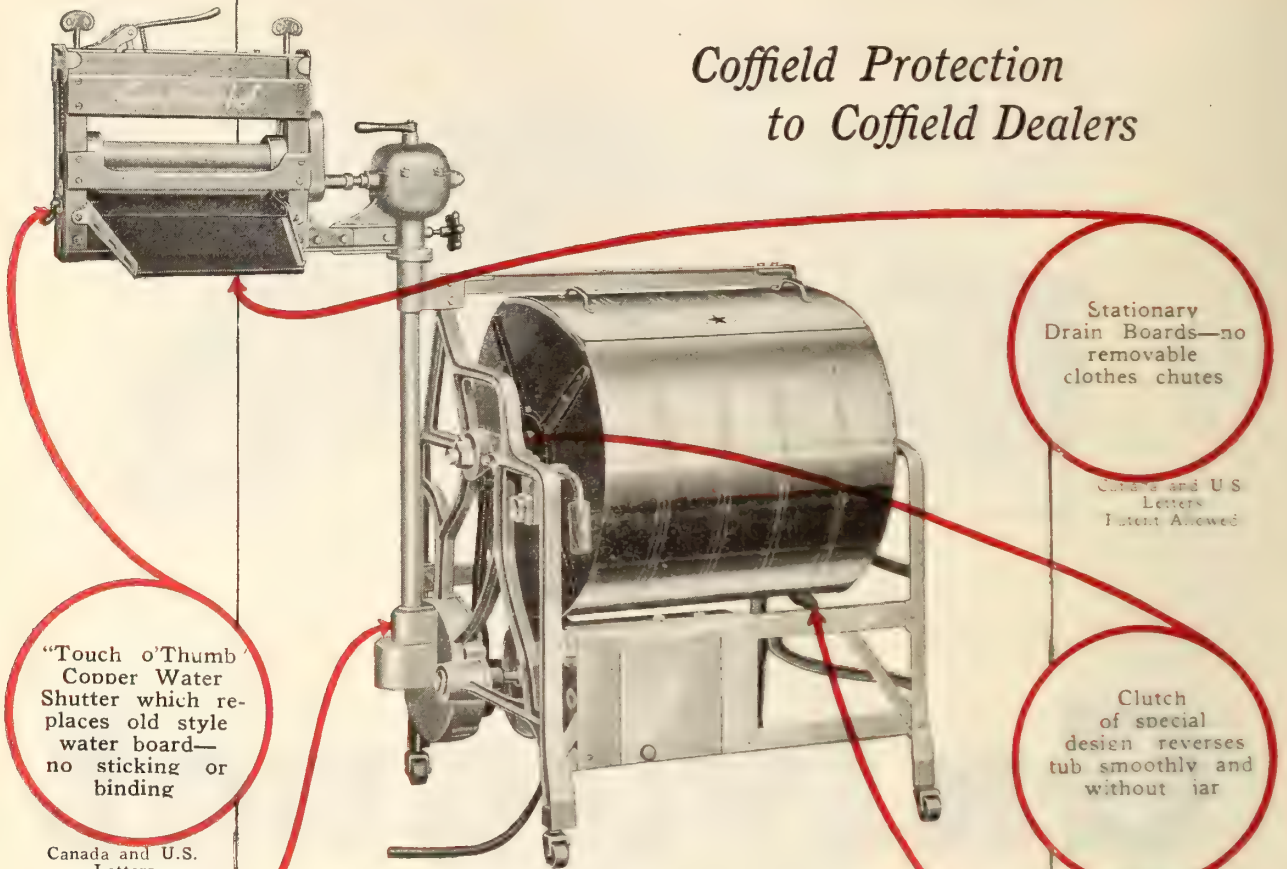
TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

"BUILT-IN" QUALITY INSURES FAITHFUL SERVICE

*Coffield Protection
to Coffield Dealers*



Stationary
Drain Boards—no
removable
clothes chutes

Canada and U.S.
Letters
Patent Allowed

Clutch
of special
design reverses
tub smoothly and
without jar

Canada and U.S.
Letters
Patent 1280166

Drain Faucet on
end of Tub—
swings entirely
within the limits
of the frame

Canada and U.S.
Letters
Patent 1338172

"Touch o'Thumb"
Copper Water
Shutter which re-
places old style
water board—
no sticking or
binding

Canada and U.S.
Letters
Patent Allowed

All Driving
Mechanism built
on one frame—
Compact and dur-
able

Canada and U.S.
Letters
Patent 1270379

Positive Patent Protection

As a message to Coffield Dealers—past, present and future—we direct your attention to the arrows which point out five of the many Coffield selling features which are positively protected by Canadian and United States patents and are exclusive to this Washer.

There are many other reasons why the Coffield is superior—why it sells so readily and stays sold so satisfactorily.

**The Coffield Washer Co. of Canada, Ltd.
Hamilton, Ont.**

**U. S. Factory—The Coffield Washer Company,
Dayton, Ohio.**

"Producers of Wash-Day Smiles" for seventeen years

Coffield

WASHES THE DAINTY AS WELL AS THE DURABLE



MAKE MONEY

ON A

DROPPING MARKET

—It Can Be Done

(with the HENDERSON Price System)

Never before has THE SELLING PRICE been such an important factor in Business transactions as it is to-day. Never before has it been so necessary for the Contractor-Dealer to be well informed on market conditions.

The great trouble with business to-day is that confidence has been destroyed. People will buy and complaints will be eliminated if you can gain back your customers' confidence by convincing them that your prices are fair and reasonable and that they are not GUESSED AT.

95% of the General Public are reasonable and willing that you should make a reasonable profit and it is not necessary to cut and slash prices in order to "BUY" their patronage. Use the HENDERSON PRICE SYSTEM. Show your customers the printed price list that is being used all over Canada. This will do more than anything else to establish their confidence.

Why You Should Use It

- (1) You have at your finger tips a suggested retail price on all standard electrical materials from a loom clip to 300,000 C. M. Cable.
- (2) We absolutely guarantee you a profit on every article leaving your shop.
- (3) No matter how often cost prices change we keep your book up-to-date by sending you change sheets almost weekly.
- (4) In adopting our service you are helping to establish a standard price. Already between 4 and 5 hundred contractor dealers use it. It is the only thing of its kind on the continent.
- (5) Complaints of overcharges will be eliminated. Show your customers the printed price and there's no argument left.

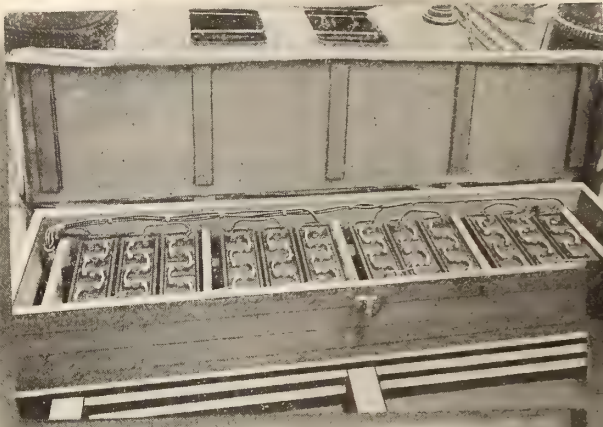
And It's Dirt Cheap---About 10c per Day.

WRITE FOR ORDER BLANK---NOW

The Henderson Business Service, Limited

Office, 235 Colborne St.

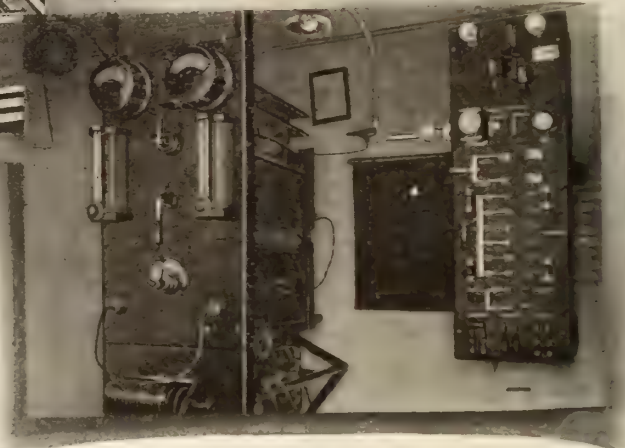
Box 123, Brantford, Ont.



Left: Exide Battery, Type MV-11, 60 cells, on deck of S.S. Comus; Southern Pacific Company.

Below: Standard wireless switchboard and 2 KW. Marconi Transmitter in wireless room of S.S. Comus.

All passenger ships of this line are equipped with Exide Batteries.



Exide
MADE IN CANADA
BATTERIES

When the Engine Room is Flooded

and the ship's dynamos hopelessly out of commission, the mighty voice of the wireless continues to send its urgent call for help.

For on their topmost decks, hundreds of lake and ocean steamers are carrying Exide Batteries against the emergency that may necessitate their use.

On sea and on land, Exide Batteries have played an important part in the history of the wireless. 33 years of battery building experience assures you of that absolute reliability so essential to the unfailing operation of the wireless.



Exide Cell Type MV
Cut away to show construction

Let us tell you more about the Exide Batteries for this service or any other storage battery purpose

EXIDE BATTERIES OF CANADA, Limited

153 Dufferin Street, Toronto

Exide Batteries are made in Canada, in England, and in the United States. Into the Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

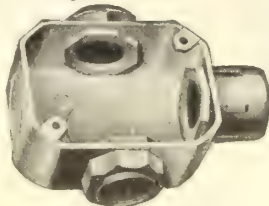
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1410
1/4" WIRELET COUPLING



Catalog No. 1420
1/4" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment

"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Simple and Safe to Operate

Krantz Panel Boards are ideal for schools, apartment houses, hotels, etc. - in fact, wherever there are children. A child could even operate one without the slightest danger. All live parts are concealed behind a locked door and the key is held by the electrician.

Krantz Panel Boards are also to be recommended for their smart appearance. They can be installed anywhere without detracting from the appearance of the room.

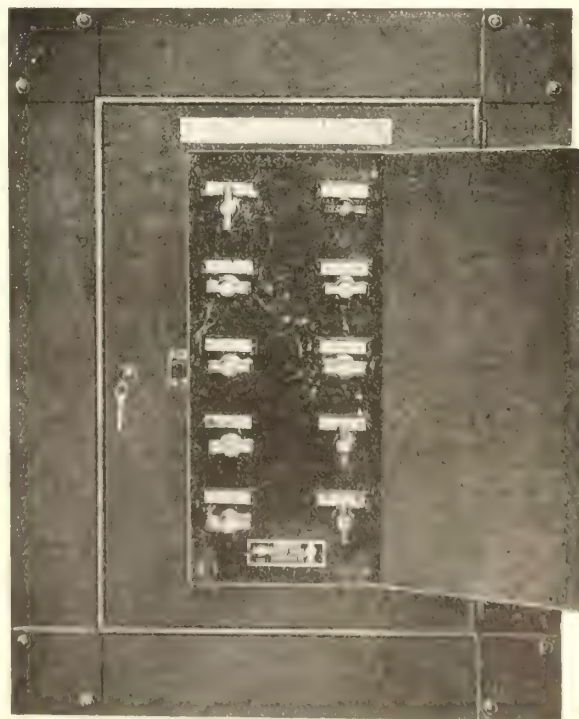
Our catalogue 12-A gives just the information you want. Why not send for a copy?

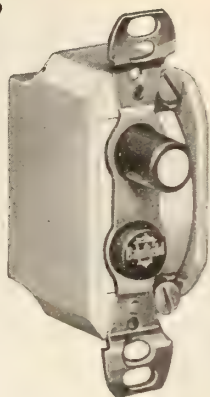
**The Canadian Krantz
Electric and Manufacturing Co.**
95 King Street East, TORONTO

401 New Birks Building, Montreal, Que.

402 Vancouver Block, Vancouver B.C.

703 Confederation Life Bldg., Winnipeg, Man.



"BANFIELD"**Flush, Push
Button
Switches**

We beg to announce a complete line of Push button flush switches, consisting of Single pole, Double pole, and Three point switches.

They have been designed to meet the demand for a high grade medium priced line, and contain the following features:

SMALL sized porcelain cups. Will fit all switch Boxes.
Simple, Quick, Quite Positive in operation.
Phosphor Bronze Contacts. Large Binding Posts Wire.
Holding screws upset to prevent dropping out.
Dust proof covers.

*Made in Canada by Canadian Labor for
Canadian Trade.*

**Ask your Jobber. Give him your
orders. He prefers to sell you
Canadian made articles.**

W. H. Banfield & Sons Limited

370-386 Pape Avenue

- TORONTO

A MOTOR WITH OUT-OF-ORDINARY FEATURES, AT NO ADDITIONAL COST

With the established policy of doing one thing—and doing that well—Howell engineers have concentrated their efforts on one kind of motor. This is the polyphase induction type in sizes one to one hundred horse power.

As a result, Howell engineering and production departments have not become involved with a diversified assortment of problems as would follow if various types of motors were manufactured in the Howell plant.

Manufacturing operations are simplified because Howell Motor Frames, bearings, shafts and other parts are so built that they may be used in motors of more than one rating. However, these parts have been especially designed for the motor of largest rating in which they are used. Consequently they are more than liberal for the smaller sizes.

Such unusual standardization results in lower unit cost of production, and permits the inclusion of special features in Howell design at an outlay no greater than that of motors of less advanced construction.

These superior features which distinguish Howell Red Band Motors and insure never-faltering service, include:

- Patented recentering bearing
- Indestructible rotor
- Unusually durable windings
- Super slot insulation
- Conservative temperature rating, 40 deg. centigrade

Howell engineers will gladly furnish information pertaining to motor application. Manufacturers of machinery driven by electric motors are especially invited to refer their motor application problems to our engineering department.

Sizes of Howell Electric Motors are one to one hundred horse power. Write or wire your requirements.

Howell Electric Motors Company

Howell, Mich:

Electric Motor & Machinery Co., Ltd.

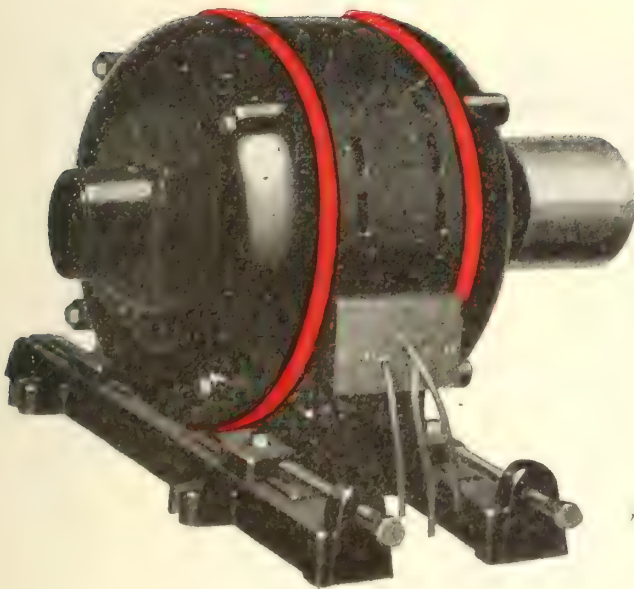
417 St. James St.
Montreal, Can.

64 Wellington St. West.
Toronto Can.

Machinery & Electric Supply Co., Ltd.

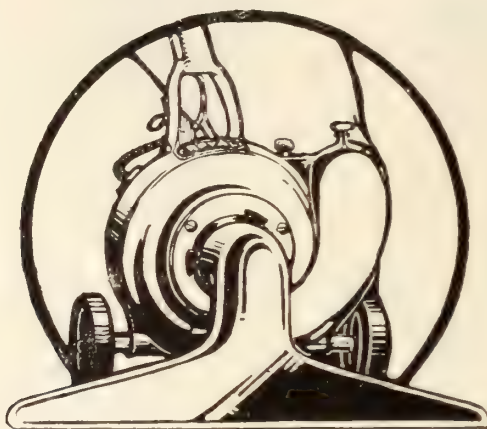
906 Electric Railway Chambers,
Winnipeg.

W. W. Fraser,
602 Hastings Street, West,
Vancouver.



Howell RED BAND ELECTRIC Motors

A Larger Day's Receipts -- Your Aim



When you put the days receipts into your safe, please pause and calculate how much of that money is for electric cleaner sales -- and how much of the cleaner money is profit. After you've measured your cleaner business by that question, we're very sure you will be interested in knowing about the



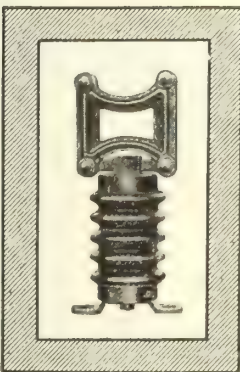
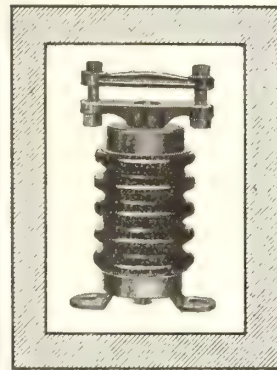
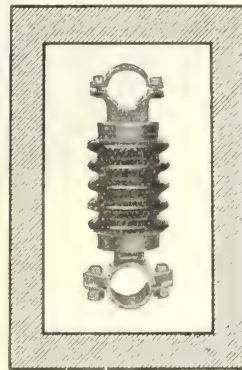
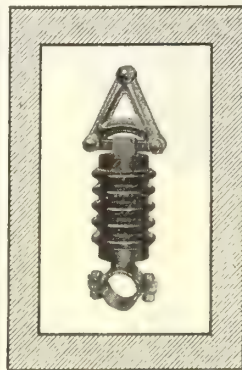
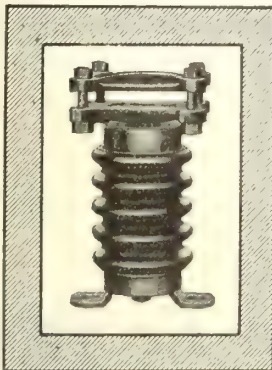
"Confidential Merchandising Plans"

... a book which discusses the whole problem of cleaner sales and profits in a common sense business-like-way -- without bluff, brag or bunk; which is the only way to discuss and weigh any business proposition. Dealers who are interested in steady sales and and sure profits -- in a larger day's receipts and a dependable margin -- are invited to investigate the ROYAL Merchandising Plans.

You will find them conservative but effective. They are the sort of tried and true sales methods which not only bring in desirable business but which enhance your prestige and add to your net profits. And these plans will help you make more money in selling other appliances besides ROYAL Cleaners.

The ROYAL Merchandising Plans are free to responsible merchants.

Great West Electric Company Limited
Winnipeg



Logical

Where your requirements are such that—
A universal type of bus bar support is desired.
Where changes may occur.
When you want—

Safety
With Quality
With Changeability
With Adjustments

And at a moderate cost.

Then Specify

"FRANKLIN JUNIOR"

Our Bulletin No. 1000, fully picturing and describing "FRANKLIN JUNIOR", will be gladly sent upon request.

**ELECTRICAL DEVELOPMENT
& MACHINE COMPANY**

PHILADELPHIA

SALES AGENTS

EASTERN STATES

CENTRAL STATES

Utility Products Corp.

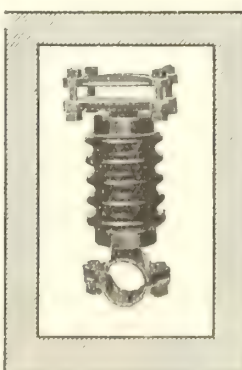
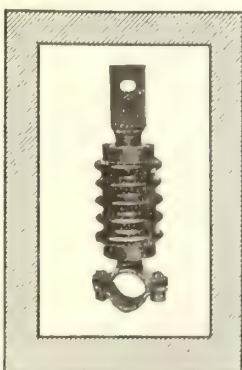
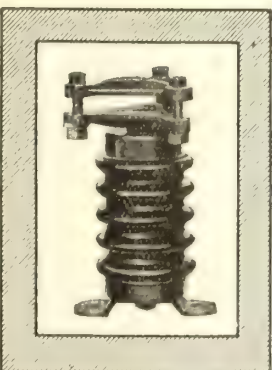
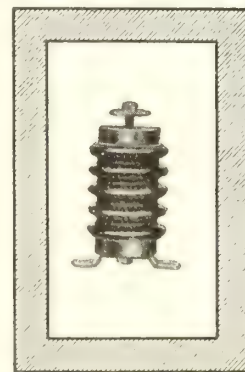
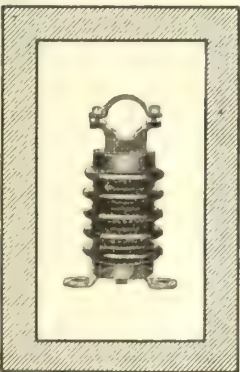
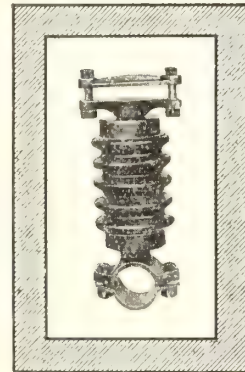
Midstates Engineering Co.

50 Church Street

Westminster Building

New York City

Chicago, Ill.





Quick Sales - - - Good Profits

PUT Miss Simplicity in your store and you will realize both quick sales and good profits. An electric washer makes an irresistible appeal to the housewife, but this is intensified almost to the point of instant sales when the very moderate price of Miss Simplicity is known.

Miss Simplicity is Canadian-made throughout and built of the finest materials obtainable. Mechanically perfect, yet very simple in operation, it is an instant favorite. Costs very little to operate and washes clothes, laces and even the daintiest of fabrics, perfectly and without injury.

Miss Simplicity gives you an excellent opportunity to capitalize on the popular demand for electric washers. You can make money fast with Miss Simplicity because each sale brings you a good profit and because quick sales increase your turnover. We give a liberal guarantee with every machine and will assist you with your advertising.

Send to-day for our dealer offer. We know it will interest you, as it has so many others.

W. A. KRIBS COMPANY, LIMITED

Hespeler, Ontario

"Takes out the
drudgery with
the dirt."



Full information will be sent on re-
sponding in full the adver-
tising material which we
have prepared for our deal-
ers.

Western Distributors
Great West Electric Company
Limited
WINNIPEG, MAN.

Quebec Distributors
Northern Electric Company
Limited
MONTREAL, P.Q.

MADE IN CANADA

BENJAMIN
 PRODUCTS

MADE IN CANADA



Benjamin Sockets

are designed for greater utility and service, as for example the Benjamin Lever Key Socket which is illustrated here. The action of the mechanism is positive—you “feel” it is right—and you “know” the current is on if the key is down and off when it is up. Another advantage too, when used as a pendent socket, is that it can be operated easily with one hand. Materials and workmanship of the best, and a capacity of 660 watts, provide for maximum service.

*For further information write to
 11-17 Charlotte Street, Toronto.*

BENJAMIN
 PRODUCTS

The following are divisions of Benjamin products on which we will be glad to send information.

Electrical Wiring Devices and Switches including Benjamin Two-way Plug Industrial Lighting Fixtures and Reflectors, Store and Office Lighting Fixtures, Panel Boards and Cabinets, Sheet Metal Drawings, Stampings and Spinings Factory and Warning signals.

BENJAMIN ELECTRIC MFG. CO. OF CANADA LIMITED
 11-17 CHARLOTTE STREET
 TORONTO

212 MCGILL STREET
 MONTREAL

311 CONFEDERATION LIFE BLDG.
 WINNIPEG

**When You Think of
Non-Metallic Conduit
Think of
"TRIDUCT"**

**When You Think of
Armored Conductors
Think of
"TRICABLE"**

**When You Think of Either
Think of the Better Jobbers**

**General Sales Agents
CONDUITS COMPANY LIMITED
33 Labatt Ave., Toronto**

G. M. Gest, Limited

Contracting Conduit Engineers

Head Office
Power Building
Montreal

Vancouver

Winnipeg



MOTORS

A few price suggestions. Let us have your enquiries

3 PHASE, 60 CYCLE, 220 VOLTS

10-H.P. C.G.E. 900 R.P.M.	\$300.00
25- " A.G.E. 1200 "	400.00
30- " A.G.E. 1200 "	425.00

3 PHASE, 60 CYCLE, 440 VOLTS

30-H.P. A.G.E. 900 R.P.M.	\$150.00
50- " Allis-C. 1200 "	650.00
50- " Allis-C. 900 "	700.00

3 PHASE, 60 CYCLE, 550 VOLTS

2-H.P. C.-W. 1800 R.P.M.	\$ 75.00	25-H.P. C.-W. 1800 R.P.M.	\$375.00
3- " C.-W. 1800 "	90.00	25- " C.-W. 900 "	425.00
3- " C.-W. 1200 "	95.00	30- " C.-W. 900 "	475.00
5- " Wagner 1200 "	115.00	35- " C.-W. 1800 "	500.00
7 1/2- " C.-W. 900 "	225.00	40- " C.-W. 900 "	600.00
15- " Lincoln 900 "	300.00	50- " C.-W. 600 "	850.00
15- " C.-W. 1200 "	300.00	60- " C.-W. 1800 "	750.00

All motors over 5 H. P. equipped with starters.
Motors are in good condition electrically and mechanically.

Write for catalogue covering other motors and generators, A. C. and D. C.

Gelinas & Pennock Reg'd
207 St. James St., Montreal

Some “BLUE RIBBON” Specials in New Electrical Equipment

This represents a splendid opportunity for those in charge of Power Houses, Service Stations, etc., to obtain high class electrical equipment at unusual prices.

The position is simply this. We have on hand

a large quantity of electrical equipment which we purchased very advantageously—some of it is just as it was received from the manufacturers, never been uncrated. All of it is in excellent condition.

The following are a few specials:

- 6 C. G. E. Current Transformers—Form D20—Cycles 25 to 125—of different Watts, Amps. and Ratios for 7,500 Volts Circuits.
- 3 Delta Star Lightning Arresters (Outdoor Type) 22,000 volts.
- 3 Delta Star Lightning Arresters (Indoor Type) 11,000 volts.
- 3 Delta Star Lightning Arresters (Indoor Type) 22,000 volts.
- 3 E. C. & M. Type 43-46 F.M. Electric Crane Brakes, 220 volts, 80 H.P.
- 2 E. C. & M. Type 24-26 F.M. Electric Crane Brakes, 220 volts, 20 H.P.
- 1 E. C. & M. Type 24-26 F.M. Electric Crane Brakes, 220 volts 5 H.P.
- 1 C. G. E. Slate Base Switchboard with two Automatic Circuit Breakers, Type C. Form K. Amps. 3,000, Volts 250—one Ammeter 0-3000 and one double contact three-leaf Disconnecting Switch.
- 4 Youngstown Safety Limit Stops E. C. & M. 220 Volts, 80 H.P. for use with Form H. Controller.
- 1 E. C. & M. Controller, Type G. Volts 220. H.P. 5.
- 2 Oil Switches, 22,000 Volts. Feeder Panel.
- 6 Choke Coils.
- 100 E. C. & M. Overload Coils, various Amps.
- 50 E. C. & M. Magnetic Switches, Type S. 220 Volts—Marble Bases.
- 4 Expulsion Fuse Holders with disconnecting switch, 11,000 Volts.
- 40 Type H. 80 H.P. Resistance Coils, Ohms. from 1. to .205.
- 2 Panel Hook Switch, 22,000 Volts (Marble Base).
- 2 E. C. & M. Crane Switchboards, Type S. 220 Volts, 750 H.P. 2,000 Amps. 250 V. D. C. 500 V. A. C. Slate Base.
- 2 Outdoor Telephones with outer and inner doors, W.E. 1336.

Let your representative look these over if at all possible—it will surely pay you. Or write us for anything you require and it will receive our careful attention. In addition to the above there is all sorts of electrical equipment to be seen and sold—cheap.

Consumers Metal Company Limited
20th Ave., Lachine, P.Q. Tel. Melrose 600

ITE

CIRCUIT BREAKERS

BETTER AND CHEAPER THAN FUSES
THE CUTTER CO. PHILADELPHIA

Sell It With Light

Attractively illuminated store windows and a glimpse of a cheerful interior will do much to encourage customers to enter your store.

Once inside—your merchandise is displayed to the best advantage by scientifically designed lighting.

Let us introduce you to a Lighting Expert

Because if your store is not efficiently illuminated by electricity, and no one has shown you how costs can be cut down and sales boosted by proper lighting, we shall feel that we have not fulfilled our mission as the National Electrical Journal of Canada.

Electrical News

Engineering
Contracting

Merchandising
Transportation

349 Adelaide Street West, Toronto

\$2.00 a Year

Twice a Month



A Waterproof Fibre that gives Perfect Insulation

"Condensite Celeron" is Diamond Fibre in waterproof Form.

It's tensile strength is 12,000 to 15,000 pounds per square inch with grain, and its dielectric strength 200 to 400 volts per mil of thickness. It is far superior to any other noiseless gear material and, for insulation where there is moisture, it is in a class by itself.

"CONDENSITE CELERON" can be drilled, tapped, threaded and turned in a lathe. It has all the good qualities of metal and none of the bad. It is denser, tougher, longer-lasting and higher in heat and moisture resistance. For insulation and equipment on rail-roads, in the automotive, electrical or transportation field, the world over, Diamond Fibre has proved itself the superior insulating material.

Send for samples and literature, or let our representative call on you and tell you all about Diamond Fibre and its uses.

Diamond State Fibre Company
of Canada, Limited.

Head Office and Works
235 Carlaw Avenue,
TORONTO, ONT.



*Used
From*

*Universally
Approved*



Moloney
*A purely
Canadian made
Product.*

Transformers
*All inquiries
receive prompt
attention.*

*Coast
to
Coast*

*Reliable
and
Efficient*

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg

District Offices

Factory

Head Sales Office

Montreal and Halifax Windsor, Ont. 1221-2 Bank of Hamilton Bldg. Toronto

THE CANADIAN IRONER

Sells Easily at Good Profit

This time and labour saving machine has proven a big seller everywhere. Simple and efficient in operation, it will do in one hour work requiring half a day by hand, and do it better. The Canadian ironer is supplied in three sizes, 46 in., 42 in., and 37 in., actual ironing width, and either Electric, Gas or Gasoline driven.

*Every Club, Institution
Sanitarium, Boarding
House, Hotel and Laundry
is a Good Prospect.*

Notice—Don't fail to get our new revised price list with discounts

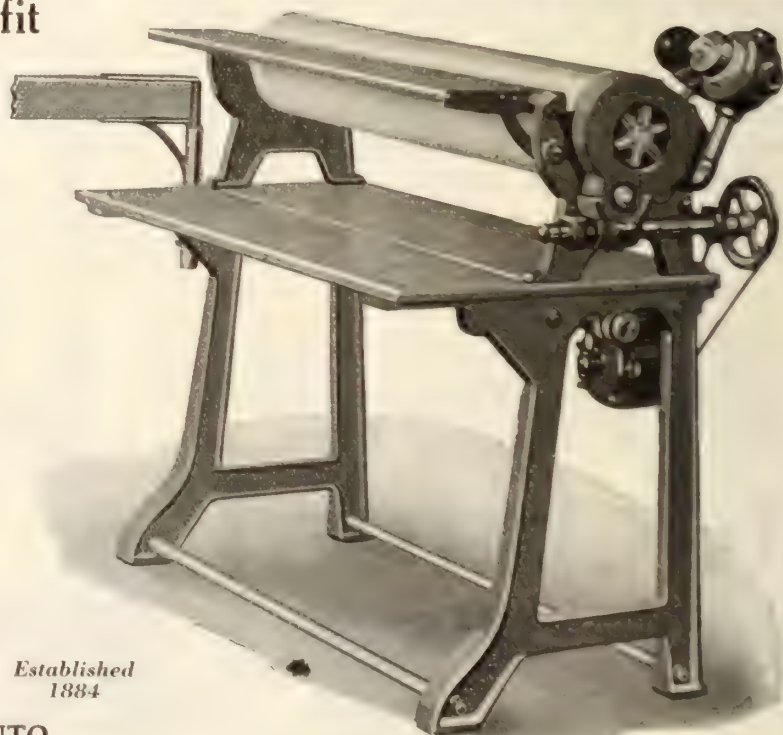
Made In Canada by

MEYER BROS.

*Established
1884*

99-101 Queen St. E., TORONTO

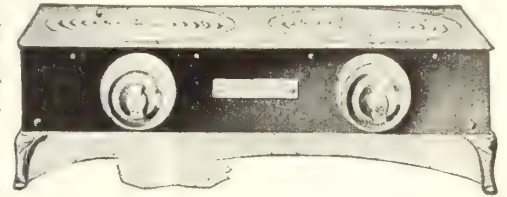
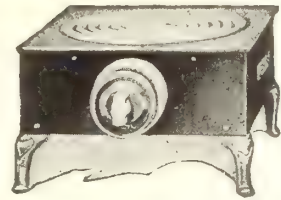
423 St. James St., MONTREAL



MOFFAT'S ELECTRA'S



A few reasons why you should handle Moffat's Electras constructed with heavy Armco iron, four times the life of steel. Insulated double jointed nickle plated doors with white enamel panels, mercury or round compensating thermometer. Quick powerful burners, wire under the burners protected from moisture. Each burner supplied with individual covered cutout. Burner coils made from heavy chromium nickled wire; burners easily removed and do not require experts to make repairs. Three heat switches and heavy duty switch for 1700 watt burner. Hot Plates are sturdy, well constructed with same burners as the Ranges. A large stock always on hand. Write for catalogue and discount sheet.



FRANKE, LEVASSEUR & CO., LIMITED

DISTRIBUTORS FOR QUEBEC AND THE EASTERN PROVINCES

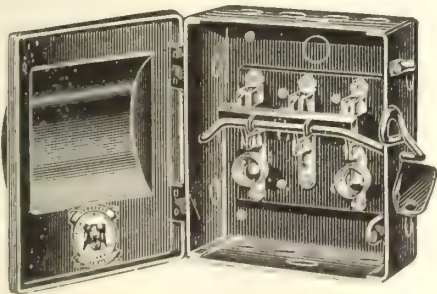
150 CRAIG ST., W.

MONTREAL

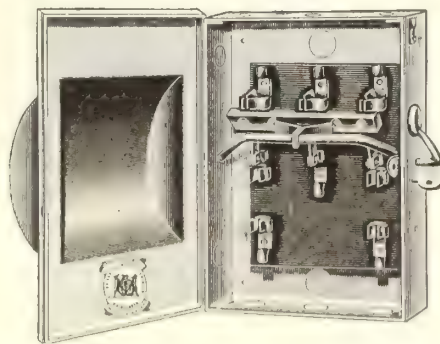
CANADIAN DRILL & ELECTRIC BOX

Company, Limited, Toronto. In effect July 1st, 1921.

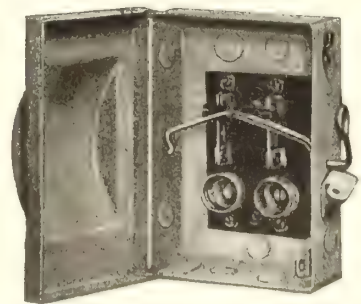
A safe bet-three favorites



No. 1030 N.—30A. 125V. 3P. Solid Neutral, Plug Fuse, absolutely the neatest and most efficient on the market.
PRICE—Standard Packages of 10 Boxes\$3.25 Net
Broken Packages \$.365 "



No. 2031 N.—60A. 250V. 3P. Oxy-acetyline welded covers, quick brake attachment on each blade, as known only on the famous C. D. & E. B. Co.'s product.
PRICE—Standard Packages of 4 Boxes\$8.75 Net
Broken Packages \$.925 "



No. 1020—30A. 125V. 2P. The Wireman's Friend. Non-breakable Composition Base.
PRICE—Standard Packages of 12 Boxes\$1.59 Net
Broken Packages \$.185 "



Attractive, Isn't It?

STRIKING window displays are just one part of the complete sales assistance furnished to Eureka dealers. In addition to the periodically renewed display material, suggestions for unique and attractive trims are supplied every month by an authority engaged for the specific purpose of turning Eureka windows into Eureka salesmen.

Always available to Eureka dealers are several newspaper campaigns, street car cards, window and counter displays, moving picture slides, a variety of booklets, and a helpful monthly sales magazine.

Eureka dealers have always been carefully chosen. As a result, our sales have mounted steadily and our dealers have prospered. But some profitable territory requires additional dealers and we want to hear from individuals and corporations who operate on a sound basis and who know how to properly sell a cleaner whose popularity and superiority were established many years ago. For such men we have an interesting proposition.

EUREKA VACUUM CLEANER COMPANY
KITCHENER, ONT.

Winner of Grand Prize at the Panama Pacific Exposition, San Francisco, Grand Prize and Gold Medal at Brussels, Belgium, February, 1920, and Grand Prize and Gold Medal at Milan, Italy, July, 1920.

EUREKA
Draws the
Air Clear Through

Packard
TRANSFORMERS

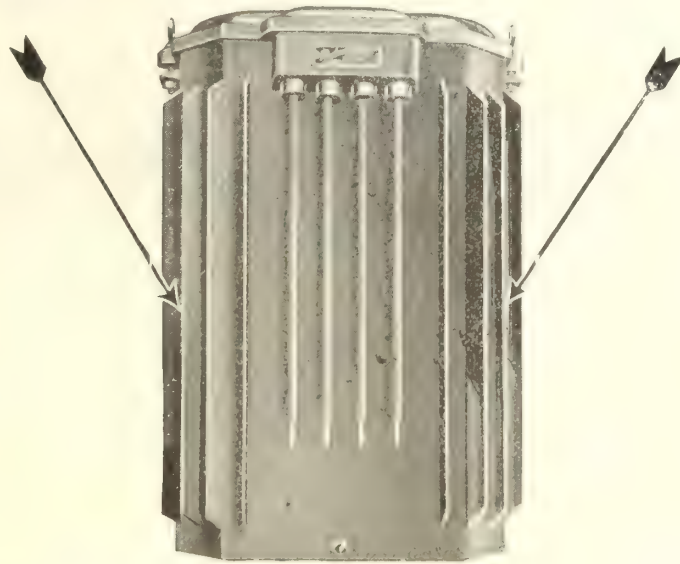
LOOK! Something New!!

Heat Dissipators

ON OUR

Welded Steel Cases

ADVANTAGES—Smaller Transformer, Less Weight,
Lower Temperature Rise, Greater Overload Capacity



Others may follow, but we lead.

The Packard Electric Co., Limited
St. Catharines, Ontario

401 Temple Building, Toronto

421 Power Building, Montreal

Confederation Life Building, Winnipeg

Agents:

Eastern Electric Co., Limited, St. John, N.B.

J. T. Warren, 738-11th St. West, Calgary, Alta.

W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.



We built the Motors

and the motor controls for two 150 ton cranes supplied by the Dominion Bridge Company, Limited, Montreal, for the power house of the Hydro Electric Power Commission of Ontario Chippawa development. This covers two sets of motors, four for each crane. Three are on the trolley as illustrated above and the fourth is for the bridge operation. Another tribute to Canadian service, as all our products are designed and built complete in St. Catharines.

Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL



Every service which is performed electrically on the modern farm is provided for in the R. & M. line of farm motors. R. & M. 32-volt direct current motors for private plant service and alternating current motors for high line service are finding a ready sale in every prosperous farm community. Distributors and dealers who are following this class of business up are finding it well worth going after.

The R. & M. line of farm motors is advertised dominantly in the leading farm publications, and dealers and distributors are provided with attractive sales literature for local advertising.

THE ROBBINS & MYERS COMPANY
OF CANADA, LIMITED

BRANTFORD, ONTARIO

Robbins & Myers Motors

What We Are Doing For Dealers

DEALERS who handle our line of Electrical Appliances will reap the benefit of an especially forceful advertising campaign. The advertisements are now appearing in the best daily newspapers in the bigger cities from Montreal to Vancouver.

These newspapers include such widely distributed journals as the Montreal "Gazette," Toronto "Globe," Toronto "Mail & Empire," Toronto "Daily Star," Hamilton "Spectator," Brantford "Expositor," London "Free Press," Winnipeg "Free Press," Winnipeg "Tribune," Regina "Leader," Calgary "Herald," Saskatoon "Star," Edmonton "Journal," and Vancouver "Province."

Strong selling ads. will also appear in Toronto "Saturday Night."

The total circulation of these papers is 686,433.

Each paper will be read by approximately four people. Each advertisement, therefore, will tell its story to 2,745,732

prospective buyers of New Canadian Beauty Electrical Appliances!

Our new set of window cards are being shipped to our dealers. They were designed and painted by real artists. They are beautiful and effective.

We have also produced leaflets for consumer distribution which go into fine details about the various Canadian Beauty Appliances. These we supply to dealers in the quantity desired. Dealers are also most enthusiastic about these little sales helps.

Please remember that this is not just an empty promise. The campaign we have outlined will be carried out to the letter. We believe in giving our dealers every possible encouragement and support.

Write at once for our liberal plan, literature, prices, etc.

Renfrew Electric Products, Limited

Head Office and Works: Renfrew, Ont.

29 Richmond St. West, TORONTO, ONT.

803 Lindsay Bldg., WINNIPEG, MAN.

The New
Canadian Beauty
Electrical Appliances





For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

HUGH C. MACLEAN PUBLICATIONS LIMITED

THOMAS S. YOUNG, Toronto, Managing Director

W. R. CARR, Ph.D., Toronto, Managing Editor

HEAD OFFICE - 347 Adelaide Street West, TORONTO

Telephone A. 2700



MONTREAL - - 119 Board of Trade Bldg.
WINNIPEG - - - Electric Ry. Chambers
VANCOUVER - - - - Winch Building
NEW YORK - - - - - 296 Broadway
CHICAGO - - Room 803, 63 E. Adams St.
LONDON, ENG. - - 16 Regent Street S. W.

ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for \$2.00 per annum. United States and foreign, \$2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean Publications Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, July 1, 1921

No. 14

Industrial Standardization of Engineering and Allied Products

A conference, unofficial in character, of the secretaries of the various standardizing organizations at present in existence has recently been held in London. The conference was convened by the secretary with the cordial permission of the main committee of the British Engineering Standards Association and was opened by the chairman of the association, Sir Archibald Denny, Bart. The following secretaries were present:

Dr. P. G. Agnew, U.S.A.; Mr. R. J. Durley, Canada; Mr. A. Eriksen, Norway; M. G. Gerard, Belgium; Mr. E. Hijmans, Holland; M. Zollinger, Switzerland; Mr. C. Le Maistre, Great Britain.

The object of the conference was the exchange of ideas looking towards the establishment of closer relationship and from this point of view it was eminently successful. Each secretary gave a brief report of the general organization of the work in his own country, the methods adopted in arriving at the standards as well as the principles followed to ensure their adoption when issued. It is interesting to note that in most countries it is becoming more and more recognized that industrial standardization whether of quality or dimensions to be really useful must be arrived at through a process of unifying the needs of industry rather than by attempting to set up an ideal. It also appears that whereas engineers are everywhere giving freely of their time and experience to this important work its value to commerce

generally is far too little appreciated and is therefore not being supported financially to the extent it should be.

Some enthusiasts are rather apt to think that the time has arrived to attempt to create an International organization for standardizing all engineering products, but the conference, it is understood, took a much more modest view, and seeing the almost insuperable difficulties in the way preferring to see international standardization develop along national lines and sectionally similar to those adopted for instance by the electrical industry in the case of the now well established International Electro-technical Commission.

The conference having no executive functions whatever, each secretary will in due course submit to his respective organizations the suggestions of the conference on the various points discussed.

The secretaries were entertained by the British Engineering Standards Association during their four days' conference.

The human factor enters so largely into all questions of standardization that for the secretaries of these important bodies to meet and become personally acquainted and thus have an opportunity of comparing notes in this informal way is bound to be of no small advantage in the future and materially assist in guiding international intercourse on this complex question along right lines.

Vancouver Electric Club Luncheon

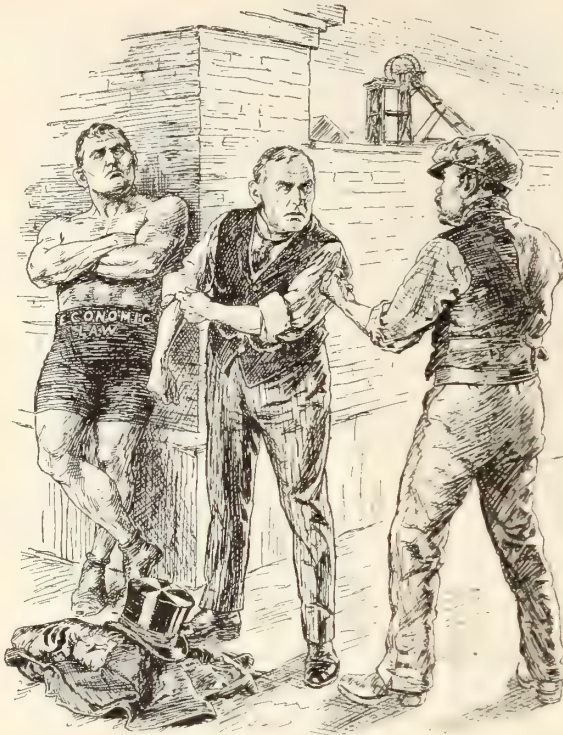
At the regular weekly luncheon of the Electric Club of Vancouver, on Friday, May 27th, a very interesting address was given by Mr. George B. Hansuld, vice-president of the Kiwanis Club. The speaker, after dealing with the work being done by the Kiwanis Club, stated that they were now endeavoring to have the Provincial Government erect some permanent buildings in connection with the British Columbia University on their permanent site at Point Gray. He stated that owing to the cramped quarters in which the students were now located and the need for larger accommodation, that at least 300 students would have to be refused admission to the university this coming Fall. He further stated that the Kiwanis Club were sending a large representative delegation to approach the Government on June 6th, and asked that the Electric Club appoint a delegate to assist them. The president assured the speaker that the Electric Club were heartily in favor of having the Government erect new buildings, and a motion was passed asking the president to go to Victoria with the Kiwanis delegates on June 6th.

Montreal Electric Luncheon Club Has Philanthropic Aims

The Montreal Electrical Co-Operative luncheon is not an organization merely for trade purposes—it aims to assist various movements having for their objects the betterment of national, social and civic life. It was in this spirit that two hundred members and their friends on June 4th visited the Boys' Farm at Shawbridge, P.Q. To quote the circular issued by Mr. Lee Johnson, Chairman of the Committee, "The purpose of the picnic is to give us all a better idea of how delinquent boys are trained so as to take their places as good citizens and also by our presence to show the boys that we are interested in their welfare"

The picnic was well organized, and its complete success was a tribute to the work of the following committees:

Sports:—Messrs. T. H. Chennell, J. W. Pilcher, Geo. Templeman; Transportation—Messrs. E. S. MacNab, S. W. Smith; General Arrangements:—Messrs. L. A. Johnson, J. O. G. Cann, W. P. Roper; President:—Mr. W. H. Winter; Clerks of Course:—Messrs. E. G. Lee, W. P. Roper; Judges:—Messrs. S. W. Smith, J. J. Sorber, J. O. G. Cann, P. A. Mc-



UP AGAINST IT.

CAPITAL TO LABOUR "YOU MAY SUCCEED IN KNOCKING ME OUT BUT DON'T FORGET THAT THEN YOU'LL HAVE TO FIGHT A CHAMPION THAT NO ONE CAN STAND UP AGAINST."

From Punch

Printers' Strike still on.

This is the second issue of the *Electrical News* since the strike began. All our other publications are coming out too--only a day or two behind time.

Not doing so badly, are we?

It is some job, surely, but obstacles that seemed insuperable at first are being gradually beaten down.

We are in this fight till we win--or Hades freezes over.

In 1920 we voluntarily gave our men a ten per cent increase. They agreed that this took care of the then high cost of living. Everything was fine, they said.

Now, with the cost of living materially reduced, they asked an increase of 36 per cent--working four hours less.

These demands were entirely at variance with the trend of the times. Employees in other industries are meeting the new conditions loyally by accepting reductions. We, on our part, shall continue the fight because we are right. The men, on their part, will continue the fight - if they do so - because agitators from the United States order them to.

Another thing--only the Open Shop in future. In recent negotiations the pressmen offered to return if we dismissed our present employees who stood loyally by us. Nothing of that kind doing. We will go out of business rather than betray loyalty.

Farlane, J. W. Pilcher; Entries:—Messrs Geo. Templeman, E. S. MacNab and D. H. Ross.

The visitors were conveyed by special train, and were greeted on arrival by Mr. Barss, the Superintendent, and the boys, who with their band, escorted the guests to the reception ground. From then to the moment that the visitors left the time was fully occupied. The day was well spent—it was as enjoyable to the visitors as to the boys. A long programme of sports was arranged, the members of the Luncheon having contributed to a fund for the prizes, with a special prize of a very fine wrist watch by Mr. J. W. Pilcher, for the boy obtaining the largest aggregate of points. A baseball game between the members and the boys ended in a draw; while in a tug of war, victory rested with the boys.

Luncheon was served in the main building, after the prizes, consisting of balls, bats, sweaters, etc., had been distributed by Mr. W. H. Winter. Several short speeches expressing appreciation of the work of the Boys' Farm, and referring to the success of the picnic were made by Messrs. Winter, T. H. Chennell, J. W. Pilcher, L. Johnson, J. N. Mochon, N. Richards and G. Templeman. Mr. Barss, the Superintendent, briefly replied, alluding to the difficulties of the work.

Mr. L. Johnson, on behalf of the Entertainment Committee, presented Mr. Chennell with a set of pipes for his efforts in making the picnic such a success.

Don't forget the Convention of the National Association of Electrical Contractors and Dealers. It is being held in the Hotel Lafayette, Buffalo, N.Y., July 20-21-22.

Pertinent Letter from F. A. Cambridge Concerning Bathroom Fatalities

Editor *Electrical News*

In my letter to you of January 21st last, alluding to the above, I stated that we had not in this city had a fatal accident due to the use of appliances, etc., subsequent to the installation of the grounding system. I regret, however, to state that one has since occurred, due to the use of a defective air type portable heater in a bathroom. It was found on examination that the heater element coil at one point had expanded and come in contact with the frame of the heater, thus rendering the whole of the frame alive with current. This heater was not of the same or similar type to those that have occasioned fatalities in Toronto, but it is evident that insufficient clearance has been allowed by the manufacturer in the design of this heater, which, I may say, is of U. S. origin, but is now, I understand, being manufactured in Canada.

The neutrals of the distributing system in that section of this city are thoroughly grounded to the water mains—the voltage of the circuit being 122. The victim was, at the time, in the bathtub, and apparently attempted to pull out the metal-sheathed disconnecting plug attached to the heater. She was heard to scream more than once, but considerable delay arose in reaching her owing to the door being locked from the inside.

This accident brings out the point that the manufacturer can do a great deal to reduce accidents by a little more intelligent care in the design of the heaters with regard to the life risk. There are also a number of types of heaters on the market that depend too much on fragile mica washers for insulation, the slightest movement of which may at any time make the frame alive. I therefore think that in both these points manufacturers can help to a very considerable degree.

Another point that I think is worthy of notice is, that, according to Underwriters' rules, portable heaters are required to be equipped with cord largely composed of asbestos and cotton insulation; this is, of course, very absorbent and that fact may in some cases be responsible for shocks. It might be worth while to discuss the question as to whether the life or the fire risk is the more important one to take care of. In the matter of portable cords, of course, it is true that the cord may in a number of cases be in contact with the heater, and that of course would render rubber unsuitable. Perhaps a middle course might be followed in which more rubber might be placed on the cord.

It is evident that the work of grounding the secondaries, while giving adequate protection against both tension or 220-volt shocks, brings with it an increase in the danger of 110-volt shocks. Regulating authorities should, therefore, pay adequate attention to the elimination of exposed live contacts, and to the design of appliances that are placed in the hands of the public, so that, as far as is practicable, the 110-volt risk may be reduced to the lowest possible minimum. Propaganda such as that sent out by the Listowel Commission would be very helpful.

In this connection I have noticed with regret that in the evolution of so-called "toggle" switches in both the United States and Canada, there are designs being placed on the market in which the operating handle is composed of a metal member covered with a moulded insulating material, this metal being alive with current when the switch is in the "on" position. This is a complete reversal of European practice which has always followed the course of having a metal operating handle completely insulated from the current-carrying parts. It is well known to men who are familiar with installation hazards that operating handles of snap and other switches are very frequently broken, and the evolution of the above type of toggle switch is inferior to the ordinary snap switch in that the metal post carrying the handle of the latter is "dead" at all times. I merely cite this as an instance of how the manufacturers do not adequately study the life risk and until we get the active and whole-hearted co-operation of manufacturers in these matters, it will be difficult to deal with this question.

Another point that should be considered in the discussion of these fatalities, is the fact that it is only rarely that any attempt is made to apply treatment for electric shock. In this case, the two medical men called in perhaps arrived too late to warrant its application. On the other hand, I fail to remember a case (and I have unfortunately been connected with a number of these accidents) where any attempt has been made by medical men to even attempt resuscitation. In that admirable booklet issued by the H. E. P. C. embodying the recommendations of the American Medical Association and the National Electric Light Association, Dr. W. B. Cannon of Harvard University, being chairman of the investigation commission, it is stated on Page 6 that artificial respiration should be continuously applied until rigor mortis sets in, and again on Page 16, "The ordinary tests for death are not conclusive in cases of electric shock and doctors must be so advised by YOU, if necessary." I remember a recent case in this City where a police officer, thoroughly trained in first aid, was administering artificial respiration, and was informed by the doctor who subsequently arrived, that it was no use, and that he might as well desist. I venture to suggest that representations might very well be made to Medical Associations in this connection.

Yours truly,
F. A. Cambridge,
City Electrician.

Winnipeg, Man.

The second annual Electric Show of the Border Cities, to be held in conjunction with the Pure Food Show, will be held in the Armories, Windsor, Ont., from October 17 to 24.

Hydro-electric Power Commission will Distribute Power to Rural Districts by Under-ground Cables

Much interest has been aroused by reports that the Hydro-Electric Power Commission of Ontario are planning to distribute light and power in rural districts by laying underground conductors. The letter printed below is being sent out by the Commission to the various interested municipalities, and answers, in a general way, the questions that have been asked.

The general plan that has been worked out by the Commission is that primary distribution i.e. 3 phase, 2200 or 4000 volts, should be by overhead construction. It is only where single phase branches are led off from this 3 phase line that underground distribution is contemplated. The engineers of the Commission have figured out that under favorable conditions the cost of underground distribution would be about \$800 per mile, as compared with \$1,200 for single phase overhead. So as to be on the safe side, the figures given in the letter are calculated on the \$1,200 basis.

Where it is found convenient to utilize underground feeders, the construction proposed is a single No. 6 copper wire enclosed in a lead casing, to which a No. 8 copper is attached—the lead covering and the No. 8 representing the ground return and having a capacity approximately equivalent to the No. 6 enclosed feeder.

It is proposed to place this cable approximately a foot under ground, the trench being excavated and filled by a specially constructed plow, so that practically no hand labor is required.

Under the Act recently passed by the Ontario Legislature, fifty percent of the cost of primary distribution to rural districts is paid for by the province.

The letter to the municipality follows:

LETTER TO RURAL MUNICIPALITIES.

In respect to certain petitions received from your Township through your Council from time to time, requiring estimates on the cost of supplying power to such petitioners, I am instructed to advise you that all estimates forwarded by this Commission are hereby superseded on account of certain revisions adopted in the manner of serving rural districts, and chiefly on account of the recent legislation bonusing rural lines.

I am instructed to advise you that the supplying of power in rural districts shall be conducted after a manner outlined in the revised legislation, part 11-B of the Hydro-Electric Power Commission Act.

It is required that a proper contract be executed between your Council and the Commission for a supply of power and to permit of the Commission constructing and operating the lines necessary to serve the customers.

The Commission will conduct the business associated with the rendering of service to your customers, and will properly account to your Council for all charges and revenue connected therewith.

Users of power in your township will be required to sign a contract with the Township, and may choose, with certain limitations, classes of service outlined as follows:—

Class I.—Hamlet service includes service in hamlets, where four or more customers are served from one transformer.

This class excludes farmers and power users. Service is given under three sub-classes as follows:—

1-A.—Service to residences where the installation does not exceed six lighting outlets or twelve sockets. Use of appliances over 600 watts is not permitted under this class.

1-B.—Service to residences with more than six lighting outlets or twelve sockets, and stores. Use of appliances over 750 watts permanently installed is not permitted under this class.

I-C.—Service to residences with electric range or permanently installed appliances greater than 750 watts. Special or unusual loads will be treated especially.

Class II.—House Lighting—Includes all contracts where residences cannot be grouped as in Class I. This class excludes farmers and power users.

Class III.—Light Farm Service—Includes lighting of farm buildings, power for miscellaneous small equipment, power for single phase motors, not to exceed 3 horse power demand, or electric range. Range and motors are not to be used simultaneously.

Class IV.—Medium Single Phase Farm Service—Includes lighting of farm buildings and power for miscellaneous small equipment power for single phase motors, up to 5 horse power demand, or electric range. Range and motor are not to be used simultaneously.

Class V.—Medium 3 Phase Farm Service—Includes lighting of farm buildings and power for miscellaneous small equipment, power for 3 phase motors up to 5 horse power demand, or electric range. Range and motor are not to be used simultaneously.

Class VI.—Heavy Farm Service—Includes lighting of farm buildings and power for miscellaneous small equipment, power for motors up to 5 horse power demand, and electric range, or 10 horse power demand without electric range.

Class VII.—Special Farm Service—Includes lighting of farm buildings, power for miscellaneous small equipment, power for 3 phase motors from 10-20 horse power demand, and electric range.

Class VIII.—Syndicate Outfits—Includes any of the foregoing classes which may join in the use of a syndicate outfit, provided the summation of their relative class demand ratings is equal to the kilowatt capacity of the syndicate.

The estimates on the cost of power delivered to users as herein set out has been based upon certain assumptions, some of which are as follows:—

The construction of the lines shall be undertaken and paid for by the Commission. The farmers in the vicinity of the roads along which the lines pass will assist in the construction and assistance will be paid for at a suitable rate of wage. Lines constructed from the line on the highway to customers' premises will be paid for by the customer. The Commission proposes to supply the necessary expert labor to direct the construction of the lines and the installation of the equipment. It has been assumed that three farmers per mile of line, or the equivalent, are obtainable as an average for the entire district to be served. The supply of poles at low prices in the district or the vicinity of the district by efforts on the part of those desiring service will result in the reduction of the cost of construction and corresponding reduction in the cost of service. Co-operation resulting in the reduction of cost of construction is desired. The rates herein set out are also based upon a government bonus of 50 percent of the cost of primary lines constructed on the highway or along the right-of-way.

Charges for power delivered shall consist of two parts, namely the service charge and the consumption charge. The service charge, which constitutes the greater portion of the total cost of power delivered, consists of the operating, maintaining and fixed charges of the lines and equipment required to deliver the power to the users in the district. Consumption charges will be determined by a meter at each customers' premises, which will measure the quantity of power used to which a suitable rate will be applied. This cost can only be arrived at when the amount used has been determined. The rate used in the district will be determined by the cost of power at the transformer station supplying the district. The amount of power supplied to the district will be metered at the transformer station.

The meter rates for uses in that part of your Township which will be supplied from . . . station are estimated as follows:—

6c per Kilowatt hour for the first 14 hours' use per month of customers' class rating.

3c per Kilowatt hour for all remaining uses.

Less 10 percent for prompt payment.

The following table gives class demand rating, average monthly kw. hrs., estimated consumption charge, estimated service charge, and total estimated annual cost for each class:—

TABLE I.—TWENTY-FIVE CYCLE POWER.

Class	Name	Demand		Kw.	H.P.	K.W.H.	Est. An.	Est. An.	Est. An.
		Ratio	Rating				Charge	Service Charge	Annual Cost
I	Hamlet Service (b)	1 1/2	2-3	10			5.52	17.50	23.02
II	House Lighting	1	1-3	15			8.16	20.80	28.96
III	Light Farm Ser.	3	4	40			25.92	81.44	107.36
IV	Medium single phase farm ser.	5	6-2-3	70			45.36	111.30	156.66
V	Medium 3 phase farm service	5	6-2-3	70			45.36	84.50	129.86
VI	Heavy farm ser.	9	12	150			89.40	180.07	269.47
VII	Special farm ser.	15	20	300			165.24	188.90	354.14

TABLE II.—SIXTY-CYCLE POWER.

Class	Name	Demand Rating Kw. H.P.	Avg'e Monthly Consmp. K W.H. Charge	Est. An. Consmp. Charge	Est. An. Service Charge	Est. An. Total Cost	
I	Hamlet Service	1 1/2	2-3	10	5.52	17.80	23.32
II	House Lighting	1	1-3	15	8.16	20.80	28.96
III	Light Farm, Ser...	3	2-2-3	50	57.72	84.42	142.14
IV	Medium Single phase farm ser	5	1-1-3	15	16.80	25.40	42.20
V	Medium 3 phase farm service	5	6-2-3	40	25.92	57.76	83.68
VI	Heavy farm ser....	9	5-6-2-3	70	45.36	111.30	156.66
VII	Special farm ser....	15	9-12-150	89.40	112.70	202.10	291.50
		15	20-300	165.24	170.06	335.30	

The above costs are calculated from our knowledge of the use of electric power in rural districts under average conditions. They have been adjusted by applying the rates as set out herein.

For those unfamiliar with terms used in power measurement, it is to be noted that one kilowatt (k.w.) is approximately equal to 1 1-3 horse power (h.p.) or 3 k.w. equals 4 h.p.; and a kilowatt hour (k.w.h.) is the amount of energy generated to one kilowatt used for one hour.

The rates will be re-adjusted by the Commission from time to time in your district to cover cost. Increase in the average number of farmers per mile or lower cost of power will reduce the annual costs to all.

The Commission upon request by your Council will send a representative to explain the method of rendering service to rural communities, and will assist your Council in securing contracts with individuals desiring service.

The following information is the Commission of the National Association of Automobile Dealers and Dealers will meet in 1914-15 together. Cars will be at Sunnyside at 7:00 a.m. Monday, July 20. There will be plenty of accommodation. Reserve a seat in advance from Geo. T. Cross, Main 395.

Thirty-First Annual Convention of Canadian Electrical Association

The historic City of Quebec the Scene of One of the Most Successful Conventions in the History of the Association. Summary of Year's Work shows Progress in Many Directions. Mr. Julian C. Smith, Montreal, the New President.

The 31st Convention of the Canadian Electrical Association, held in the Château Frontenac, Quebec June 15, 16, 17 found that organization in a thoroughly active and vigorous state—both of body and mind. To the writer, it would appear that the convention just held in the city of Quebec, was the best in many years. In spite of the distances many delegates had to travel to the historic old city, the attendance was thoroughly satisfactory.

Year by year it has been noticeable that the reports of the various committees presented at the Association's conventions have been of increasing interest and value and this year was not an exception. The time appears to have gone by when the chairmen of committees satisfy themselves with making a verbal report, frequently to the effect that they regretted that their committee had been unable to obtain results. The reports that were presented this year by the various committees were—almost without exception—of very real and valuable interest, and plainly represented a large amount of work on the part of the various committee members. For the most part, also, these reports had been submitted in time to be printed—a decided advantage from the point of view of intelligent discussion.

Special features of the convention proceedings, was the address by Mr. Milan R. Bump, recently appointed president of the National Electric Light Association, and the address by Mr. K. B. Thornton, president of the Electrical Co-operative Association, Province of Quebec, at the mid-day luncheon on Thursday. Messrs. Goodwin & Chase were also guests of the convention. This, of course, in addition to the delightful little interludes of the president Mr. A. Monro Grier, who, during his tenure of office, has placed the office of president of the Canadian Electrical Association on an oratorical pinnacle which will make his successor's task no easy one. Mr. Bump's remarks to the effect that Mr. Grier was known among the N.E.L.A. members as "the silver-tongued orator of the St. Lawrence," had the entire acquiescence and approval of the Canadian delegates to the convention. It is greatly to be hoped that Mr. Grier's interest in the Canadian Electrical Association will still prompt his attendance at the conventions so that the members may have the annual opportunity and pleasure of hearing him.

Mention may also be made of another circumstance which is not always noticeable at conventions, namely, that the program was carried out promptly according to the schedule. This was no easy task in view of the fact that eighteen papers and reports, and discussions thereon, had to be taken care of during two short days. Operating on schedule evidently has much to do with maintaining the interest of the delegates.

No report of this convention would be complete without more or less detailed mention of the entertainment proceedings. Mr. A. P. Doddridge, Mr. Barran, Mr. McDonough, and the other members of the Convention Committee, were

untiring in their efforts to give information and pleasure, alike, to the out of town visitors, while the local ladies committee, in charge of Miss Jackson and Miss Fortier, were charming hostesses throughout the entire convention, delighting the lady delegates—and the gentlemen too—with their gracious hospitality.

A brief summary of events, approximately in the order in which they occurred, is given below:

Wednesday

The morning was taken up with a brief introductory address by the president, Mr. A. Monro Grier, K.C., and by the mayor of Quebec, Mr. J. Sampson. This was followed by reports of the secretary-treasurer, Mr. E. Vinet; of the Technical Section, by Mr. R. J. Beaumont; of the Meter Committee, by Mr. E. Holder; of the Electrical Apparatus Committee, read by the secretary in the absence of the chairman, Mr. W. J. Wurtele; of the Overhead Systems Committee, by Mr. O. V. Anderson, and of the Commercial Com-



Mr. Julian C. Smith, Vice President and General Manager Shawinigan Water and Power Co. and President elect Canadian Electrical Association

mittee, by Mr. M. C. Gilman. Interesting addresses were also presented by Mr. O. Higman, director Electrical Standards Laboratory, Ottawa, on "Electrical Standards and Their Application to Trade and Commerce," and by Mr. J. M. Robertson, consulting engineer, Montreal, on the subject "The Consulting Engineer and the Power Company." The afternoon of Wednesday was occupied by a trip to St. Anne de Beaupre. Here the various delegates were shown through the Roman Catholic churches and the activities were ex-

plained to them by one of the priests. The delegates were given the opportunity of visiting the curio shops of this organization and making any purchases they might desire. They also had the privilege of hearing the splendid organ that Casavan Brothers have installed in this church—one of the most delightful features of the visit.

Before returning the delegates paid a visit to the cyclorama—the large circular painting of the Holy City and the district surrounding it at the time of the crucifixion.

On the return trip Montmorency Falls was reached about seven o'clock and the delegates remained at the Kent House for dinner and dancing. Mr. Grier presided at the dinner and brief addresses were given by Messrs. Goodwin, Chase, and representatives of the technical press.

Thursday

The Thursday morning session was held in the Empire Theatre, as most of the papers required lantern slide demonstrations. Mr. W. B. Cartmel, Northern Electric Company, read a paper on "Electrons;" Mr. A. B. Cooper, Canadian General Electric Co., a paper on "Modern Street Lighting;" Mr. L. B. Chubbuck, Canadian Westinghouse Company, a paper on "Switching Equipment;" and Mr. A. D. Allen, of the A. D. Allen Inspection Company, Hamilton, a paper on "The Manufacture and Testing of High Tension Porcelain Insulators." These papers were all accompanied by interesting lantern slide illustrations.

Mid-day luncheon, attended by both ladies and gentlemen, was held in the sun room of the Chateau overlooking the river. Mr. Grier presided, and, following the luncheon, Mr. K. B. Thornton—in the absence of the Hon. L. A. Taschereau, who was scheduled to speak—outlined the activities and aims of the Electrical Co-operative Association. On Thursday afternoon, further reports were presented by Col. D. R. Street, Ottawa Electric Company, on "Accounting;" on "Public Relations," by the secretary, in the absence of the Committee chairman, Mr. D. H. McDougall; on "Accident Prevention," by Mr. Wills MacLachlan; from the "Membership Committee," by the secretary, in the absence of the chairman, Mr. M. K. Pike; and from the representatives on the Canadian Engineering Standards Association, by Mr. O. V. Anderson. Reports on the activities of the Toronto Section and the St. Maurice Valley Section of the

Canadian Electrical Association were also scheduled for this afternoon's program.

A boat trip around the harbor and up the river as far as Quebec Bridge brought the afternoon proceedings to a close.

The Thursday evening entertainment was in the hands of the Electrical Co-operative Association, Province of Quebec.

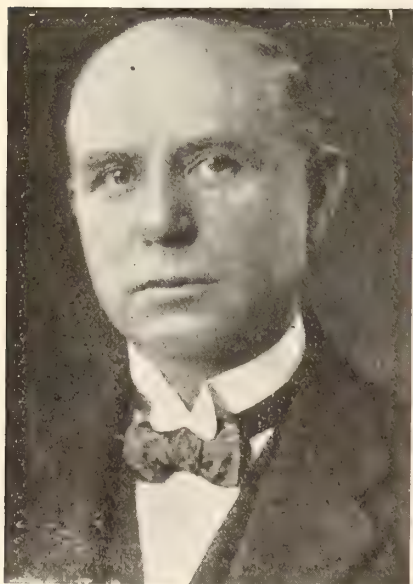
Friday

The third and last day of the convention was given over to a meeting of Class A and D members, election of officers for the ensuing year, and other private business. Mr. Julian C. Smith, vice-president and general manager of the Shawinigan Water & Power Co., Montreal, was elected president. Mr. P. T. Davies, Southern Canada Power Co., Montreal, first vice-president; Mr. A. P. Doddridge, Quebec Railway, Light, Heat and Power Company, Quebec City, second vice-president; Mr. L. W. Pratt, Dominion Power and Transmission Co., Hamilton, third vice-president; Eugene Vinet, secretary.

Executive Committee

Chas. T. Barnes, The Toronto & Niagara Power Co., Toronto; R. J. Beaumont, The Shawinigan Water & Power Co., Montreal; A. A. Dion, The Ottawa Electric Co., Ottawa; A. Monroe Grier, Canadian Niagara Power Co., Toronto; D. H. McDougall, The Toronto Power Co., Toronto; J. S. Norris, Montreal Light, Heat & Power Co., Montreal; L. W. Weston, Nova Scotia Car & Tramways, Halifax; J. B. Woodyatt, The Southern Canadian Power Co., Montreal; and one representative from each of the following companies—Canadian General Electric Co; Canadian Westinghouse Co; Northern Electric Co; Sangamo Meter Co.

— Every contractor, whether he is a member of an Association or not, should attend the Buffalo Convention of the National Association of Electrical Contractors and Dealers on July 20-21-22. He cannot fail to carry away information that will be of great value to him in his business.



A. Monroe Grier, President Canadian Niagara Power Co. who retires from C. E. A. presidency



Eugene Vinet, re-elected Secretary-treasurer Canadian Electrical Association



K. B. Thornton, General Manager Montreal Public Service Corporation and President Electrical Co-operative Association, Province of Quebec

Report of Committee on Meters

Valuable Data covering Experience of Member Companies on the performance of their Meters

Your committee was organized early in the year and a preliminary meeting was held in October. It was then decided that the work of last year's committee would be continued, so that the present report mainly follows up the resolutions passed at our last annual convention. The main subject was, therefore, the question of the seal period of watt-hour meters.

A complete report on this subject will be prepared, giving the full evidence and data collected to be placed in the hands of your main committee with recommendations as to action to be taken on this report. The report in an amended form is as follows:—

Seal Period of Watthour Meters

The purpose of this investigation was to collect evidence and data bearing on the seal period of watthour meters and their continued accuracy for a period under service conditions.

The regulations governing the testing and sealing of watt-hour meters are those contained in the Dominion of Canada Electricity Inspection Act, 1907.

This Act, paragraph No. 12 states:—

"The amount of electrical energy supplied by a contractor to any purchaser under the Act or the electrical quantity contained in such supply shall, if the purchaser so desires, be ascertained by means of a suitable meter duly certified in accordance with regulations established under authority of this Act."

A further paragraph states:—

"The suitability of the meter is to be verified and stamped before installation, and within twelve months of the expiration of five years the meter is to be recertified and restamped."

The Act, therefore, fixes very definitely the period during which a sealed meter may be left in service, and also appoints the Government inspector as the testing authority.

Your committee does not at present favor any fundamental change in method of sealing and certifying meters as the present method leads to accuracy of metering, the seal as a certificate of accuracy being a valuable asset, but confine themselves to a consideration of the time period between tests.

In the data submitted the house service type of a.c. induction meter is entirely considered as representing at least 90 per cent of the meters in use, but it is desirable that any extension of the compulsory test period apply to all types of meters. With d.c. meters it is an undisputed fact that their tendency to run slow would make a more frequent test desirable on the part of the contractor, the Act not preventing this from being done and any extension would not work an injustice upon the purchaser.

With larger power meters the desirability of greater accuracy than that called for by the regulations would similarly call for more frequent testing, which is usually a subject of arrangement between the contractor and the purchaser.

The a.c. house service type of meter is, therefore, the only type which will fall within the Act as regards the reseal period.

In the interpretation of the regulations where the contractor operates a meter department, the following system is followed:—

The new meter of an approved type is checked over at such points as experience finds desirable, and it is then passed over to the government inspector for testing and test is made

at 100 per cent and 10 per cent load and creeping, and if the meter falls within the limit of 3 per cent + or — it is certified correct, sealed and certificate issued. The meter is then ready for installation, and if its accuracy is not in the meantime disputed, remains in service for five years.

After five years the contractor is notified that the period has expired and within the sixth year the meter is brought into the shop for retesting. It is tested at the decided upon points, and the test recorded. The seal is broken, the meter is cleaned, oiled, repaired, and adjusted correct. It is then handed over to the government inspectors, who test at 100 per cent and 10 per cent load, reseals and certifies.

The meter is then again ready for a further five years' service. This system, if carefully followed, makes sure that all meters leave the shop in first-class condition and that a high degree of accuracy is maintained.

With smaller concerns that do not maintain a meter department a different system is adopted. They are visited at intervals by a government inspector, who asks that all the time expired meters be produced for reverification. The meters are brought in, tested, and if found within the limits are resealed for a further period. It then happens that the majority of the meters are put out into service for a further five-year period without receiving any further attention, and it may well happen that meters so tested have been in service for two or three test periods without inaccuracy showing up. With an extension of the initial test period it is possible that a larger proportion of the meters would be overhauled at the

RECORD OF METERS TESTED AFTER BEING IN SERVICE FOR SEAL PERIOD OR LONGER.

			100% LOAD					
Length of Service Years	Seal Year	No. Tested	Accurate 3% + or -	Over 3% Slow	Over 3% Fast	Over 10% Slow	Over 10% Fast	
A.	5	1915	221	220	1			
	5	1914	77	77				
	5	1913	388	364	18			
	6	1912	99	92	1	3		
	7	1911	91	84	2	1		
	8	1910	46	38	5	3		
			10% LOAD					
A.	5	1915	221	219	1	1		
	5	1914	77	77	0	0		
	5	1913	388	360	16	12		
	6	1912	99	90	5	1	3	
	7	1911	91	85	4	1	1	
	8	1910	46	39	4	3		
			50% LOAD					
B	5	1915	6077	5902	42	92	41	
	5	1914	2853	2773	28	21	31	
	5	1915	5878	5716	39	80	43	
	5	1912	6335	6020	42	218	55	
	5	1911	7809	7377	47	358	29	
	5	1910	8669	8414	163	46	46	
			4% LOAD					
B	5	1915	6077	5901	131	1	44	
	5	1914	2853	2691	106	0	56	
	5	1915	5878	5660	155	5	78	
	5	1912	6335	6083	166	6	80	
	5	1911	7809	7486	269	5	49	
	5	1910	8669	7599	980	3	77	
			100% LOAD					
C	0	1920	580	531	47	0	48	0
	1	1919	480	457	21	1	20	0
	2	1918	273	255	16	1	14	1
	3	1917	204	193	10	1	8	0
	4	1916	155	137	18	0	11	0
	5	1915	135	122	16	2	6	0
	6	1914	195	183	11	1	8	0
	7	1913	3818	3778	36	3	34	0
		and others	178	172	5	1	4	0
				10% LOAD				
C.	0	1920	580	529	49	0	47	2
	1	1919	480	453	23	1	22	0
	2	1918	273	250	18	2	8	0
	3	1917	204	190	13	1	8	0
	4	1916	155	137	16	0	13	0
	5	1915	135	119	14	1	5	1
	6	1914	195	180	13	2	8	0
	7	1913	3818	3765	45	9	34	0
		and others	178	165	9	4	4	0

end of the period, and the result would be a reduction of the period during which the majority of the meters are in service without overhauling and a greater degree of accuracy maintained.

It has for some time been apparent to those handling the testing and resealing of large quantities of watthour meters, that the modern a.c. house service type of meter is a very accurate and reliable instrument, and at the end of the seal period but a very small proportion were inaccurate. During the latter part of the war period it was found, owing to the great scarcity of man power, that the companies were not in a position to adhere strictly to the rules of the Government Inspection Department, and it was found that even with an increase of one, two or three years but a very small proportion of this type of meter was inaccurate and the conclusion arrived at was that the extension of the period was not impairing the accuracy of metering.

In the collection of evidence and data your committee asked member companies to submit test results according to the following form, and a large amount of valuable information was received. This not only indicated test results after the five-year period but in many cases up to a period of eight years.

The information asked for with regard to meters found inaccurate in service was not generally supplied, no separate data being apparently kept of this.

A summary of the tabulated data received shows that for over 30,000 time-expired meters tested, 96 per cent were accurate within the 3 per cent limit.

It will be noted in studying list C, that the proportion of inaccurate meters does not depend on the period during which

the meters have been in service, and that the largest number of stopped meters were amongst those which had been in service for a short period. The member company supplying this list also states that the majority of the stopped meters were registering before removal from the customers' premises, which would indicate that they had been injured whilst handling.

A number of a similar type were tested, which had been in normal service for periods ranging up to 13 years, and the attached curve shows the average full and light load accuracies of these meters plotted against the length of time for which they have been in service. It is seen that the full load accuracy changes very little, bending upwards slightly, apparently due to magnet ageing. The light load curve drops after eight years' service, due to dust and friction.

The two main points affecting maintained accuracy of watthour meters are:—

1. Friction caused by wear and dirt makes meter register slow. Chiefly on light loads.
2. Change in braking effect of drag magnets.

Shortage of the right quality of steel during the war period was looked upon as a possible source of magnet trouble, but the errors which should show up during the first period of the life of the meter are not guarded against by our present five-year period tests.

That the manufacturers of meters have the improvements of the designs along the lines of maintained accuracy at heart is shown by the following replies to questions upon this point:—

A.—Reports

"Assuming anything approaching normal conditions of service, maintained accuracy is generally considered as depending upon performance of the meter bearings and of the permanent magnets. In regard to magnets, knowledge of the proper method of manufacture and testing of permanent magnets has advanced tremendously in the last few years, and it is fairly safe assumption that the magnets of any well established meter manufacturer have a factor of safety which will assure absolute permanence under anything approaching normal conditions of service for periods of time much in excess of the period suggested for government sealing.

"The question of bearings and jewels is, of necessity, a little more uncertain. Methods of cutting and polishing jewels, hardening and finishing of pivots have greatly improved in recently years, however, and as far back as seven years ago when these methods were considerably less refined, we have a knowledge of laboratory tests under forced service conditions approximating 20 years' continuous service on two of the well-known types of meters with their own bearings, and with interchangeable bearings, without any appreciable change in accuracy.

B.—Reports

"With regard to the seal period, we see no reason why this could not be extended as far as our meters are concerned.

"The permanency of the magnets depends mostly on the heat treatment before magnetization and the artificial ageing after magnetization. The magnets used by reliable meter manufacturers can be considered practically permanent. The writer does not remember of one case in which the magnets weakened so that they had to be replaced."

C.—Reports

"We give it as our opinion that the period for the re-examination could well be extended on house service type meters."

In drawing a conclusion from the data submitted, your committee kept in mind the following points:—

1. Maintained accuracy of metering equipment
2. Maintenance of public confidence in metering equipment.

RECORD OF METERS TESTED AFTER BEING IN SERVICE FOR SEAL PERIOD OR LONGER.

			100% LOAD				
Length of Service Years	Seal Year	No. Tested	Accurate 3% + or -	Over 3% Slow	Over 3% Fast	Over 10% Slow	Over 10% Fast
D. 1	..	460	436	18	6	..	..
2	..	210	188	20	2	..	..
3	..	245	228	116	1	..	..
4	..	229	215	10	4	..	..
5	..	182	9	7	..	..	..
6	..	3182	2970	175	37	..	..
			10% LOAD				
D. 1	..	460	..	..	..	..	..
2	..	210	..	..	..	..	..
3	..	245	..	..	..	..	..
4	..	229	..	..	..	..	..
5	..	182	..	..	..	..	..
6	..	3182	..	..	..	..	..
			100% LOAD				
E. 10	1910	16	15	1	0	0	0
9	1911	39	37	2	0	0	0
8	1912	172	152	10	6	4	0
7	1913	222	189	23	2	8	0
6	1914	556	514	11	19	12	0
5	1915	584	562	8	7	7	0
			10% LOAD				
E. 10	1910	16	13	2	0	1	0
9	1911	39	34	5	0	0	0
8	1912	172	112	46	4	10	0
7	1913	222	155	59	1	7	0
6	1914	556	445	77	19	14	1
5	1915	584	496	70	9	9	0
			100% LOAD				
F. 10	1910	1	1	0	0	0	..
9	1911	4	2	0	0	2	..
8	1912	5	4	0	0	1	..
7	1913	7	7	0	0	0	..
6	1914	471	470	0	0	1	..
5	1915	256	255	0	0	5	..
			10% LOAD				
F. 10	1910	1	..	..	..	..	..
9	1911	4	..	..	..	..	..
8	1912	5	..	..	..	..	..
7	1913	7	..	..	..	..	..
6	1914	471	..	..	..	..	..
5	1915	256	..	..	..	..	..

3. Modification of cost of present test period system.

1. Maintained accuracy would be benefitted generally by an extension of the seal period by three years, eliminating part of the handling and increasing chances of each meter receiving periodically a thorough examination.

2. The data submitted shows extreme accuracy of house service type meters under extended service conditions, and that the seal affixed is a guarantee of this accuracy.

3. There were 182,000 meters sealed during 1920 which if due to be sealed after five years would cost an average of \$56,440 per year, but if extended by three years, this cost would be reduced to \$35,275 per year, a saving of \$21,165 per year upon the 1920 date meters.

Your committee is, therefore, in favour of an extension of the present five-year seal period by three years.

Provision of Sealed Entrance Boxes

The Canadian Underwriters' Electrical Inspection Bureau in an amendment of the 1920 edition of the National Electrical Code to be enforced after March 31st, 1921, have inserted the following rule:—

"The inner end of the service conduit must extend into a metal service box containing the service cutout and main disconnecting switch, located inside the building at the nearest accessible point to the place where the service wires enter the building.

"The service box must be of approved design, arranged to be operated from the outside of the enclosure equipped with a locking or sealing device, and shall be so marked as to indicate without opening the enclosure, whether the switch is in the 'on' or 'off' position."

From the point of view of the Quebec member companies such a rule is a step in the right direction, as new services will be provided with such a box as part of the wiring installation and arrangements may be made by the supply authority for sealing the same.

Meter Standardization

A watthour meter section of the Canadian Engineering Standards Association has now been formed under the chairmanship of Prof. L. W. Gill, Director of Technical Education, Ottawa, upon which committee the association is represented. It is intended to prepare specifications for watthour meters together with the necessary transformers which will have as general acceptance as possible, and will cover such points as standard method of testing, degree of accuracy to be called for, standard arrangements of dials and the like. Preliminary information is being collected.

Handling and Storing of Meters

The collection of data concerning the maintenance of watthour meter accuracy brought out the fact that more inaccuracies could be caused by rough handling between test room and customer than by continued normal service. Your committee consider it very important that attention should be given to this part of meter work, bearing in mind that meters are precision instruments. The type of storage rack adopted by one of our member companies and a later improvement of this rack are shown in the illustration.

Education of Metermen

It has been suggested that some attention might be given to the proper training of our metermen along the lines suggested by the meter committee of the N.E.L.A. It is also suggested that this subject be advantageously taken up by some of our technical schools with a view to having them adopt some such course.

Measurement of Maximum Demand

With the increase in operating costs more attention has been given during the past year to the accurate measurement of maximum demand, and the maximum demand meter has come into more general use. There is at present a necessity that a definite method be devised for the checking of these demand meters. The standardization of the time period

might also well be considered at this time. The various time periods used cover a wide range, and some call for a sustained peak and others for an average over the period. This state of indefiniteness and variation creates a bad impression in the minds of the customers, and is one which some effort should be made to remove. It would seem that a standard of 10 or 15 minutes peak would be desirable.

There is now on the market an attachment which can be applied to certain forms of demand meters, which will permit the demand being measured in kv.a. This device is sufficiently reasonable in cost and commercially accurate over wide ranges of power factor to justify the question being raised as to whether demand should not be based on kv.a. in place of present somewhat cumbersome system of kw. demand plus a penalty clause for bad power factor.

New Developments

The various meter manufacturers are now producing a high class type of meter, the a.c. induction type being specially designed for long maintained accuracy under service conditions and ease of testing and calibrating. The type R. watt-hour meter of The Packard Electric Co. and the type F.D. of the Ferranti Meter & Transformer Co. are late productions of this type, the latter introducing many new features of design. The Sangamo Co. type H. meter has now a special clip on dial and gear train and improved type of case and terminal cover.

The Canadian General Electric Co. are producing for sale

METERS TESTED AFTER BEING IN SERVICE FOR SEAL PERIOD OR LONGER.

TEST AT FULL LOAD 100%

Seal Year	No Tested	Accurate 3% + or -	Over 3 Slow	Over 3 Fast	Over 10 Slow	Over 10% Fast

TEST AT LOW LOAD 10%

--	--	--	--	--	--	--

RECORD OF METERS FOUND INACCURATE IN SERVICE

Seal Date	1920	1919	1918	1917	1916	1915	Total and Earlier

in Canada their new type M. 7 register for converting type I .14 meters into a definite time interval maximum demand meter which register makes use of a Warren motor combined in the register for the time resetting portion.

The Lincoln Meter Company have produced a new type of graphic meter driven by synchronous motor in place of the usual clock. The measuring element is the same as their standard indicating type. This combination gives an integration of the load over the time period before the pen records the same. This results in the maximum demand being the highest point the pen reaches on the chart, on variable loads this is a distinctively valuable feature.

The same company have also produced a small auto transformer which, attached to their demand meter, causes same to read in kv.a. between certain limits of power factor. Two sets of taps are provided on this transformer, one covering power factors from 99 to 65 per cent, and the other power

factors from 75 to 43 per cent. If the power factor at the time of demand is outside the connected range, any errors occurring will be in favor of the customer, which is the safe direction for an error if any is to be made, as the user cannot attack the method on the grounds of an over registration of his demands.

Your committee was also represented by four members upon the meter committee of the National Electric Light Association, and meetings were attended by these members and an active part taken in the work of this committee. It is to be noted that this committee is entirely formed from amongst central station metermen, and that their standing is such that new designs and methods are submitted to them by manufacturers for criticism.

A resumé of the work of the N.E.L.A. committee follows:

Resumé of 1921 Report of N.E.L.A. Meter Committee Educational Work

An outline of various short courses for metermen arranged by various engineering colleges and universities are given, and also of complete courses being adopted by the Westinghouse and General Electric companies. These courses were favourably reported upon by members of the committee.

Extension of Test Period

Data was collected from member companies bearing on this subject. This data reported favorably upon the continued accuracy of small a.c. induction meters. An outline of a standard form for collecting this data was made. It was decided to continue the collecting of all possible test results.

The adoption of short cut methods for speeding up tests was not favored.

Standardization of Meter Design

Desirable changes in construction of meters and instruments now being manufactured were recommended and any new apparatus or changes in present apparatus was inspected

be used when arriving at full load capacity of watthour meters.

Larger demand scales were also asked for.

3. Disc constants. To ask for standard disc constants was felt to be putting a possible restraint on new development, which is not the desire of the committee. It was appreciated that benefits would be conferred by a uniform disc constant, and a recommendation was made that should conditions ever permit, meters of same rating but of different makes should have the same constant, and that the constant should be in direct proportion to meter capacities.

4. Direction of Rotation:—A counter clockwise rotation of moving element is favored. That is, a left to right movement when looking at the front of the meter.

5. Clear Space on Metal Cover for Companies' Number:—Sufficient space on front of cover for companies' number was desired.

6. Repeating of Meter Dial:—Section of code which states that no meter should repeat when operated on full load, 24 hours per day, for 25 days, was emphasized.

7. Digest for Recommendations for years 1913-1920 was prepared from committee reports and minutes.

Meter Lecture

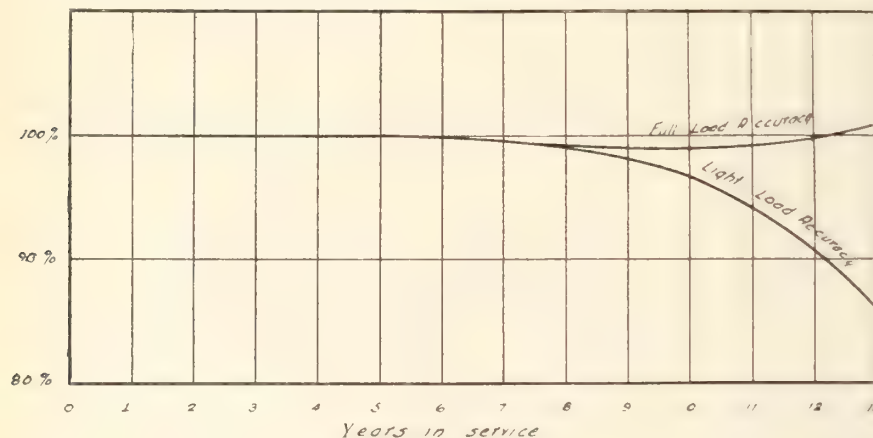
This is being prepared for publication in this year's report and separate publication. The lecture will be complete with illustrations and diagrams and will make a complete lecture on metering, available for general use and instructional purposes.

Revision of Electric Meterman's Handbook

It is proposed to start this work during the coming year, as the present edition is liable to become out of print and not to contain the latest developments.

Methods of Measuring Power Factors and K.V.A.

A complete report was prepared on this subject in which the different methods in present use are described.



Curves show Accuracy
of Watt-hour Meters
in Service

and criticised, suggestions for improvements being made.

The following are the special items taken up during the past year:—

1. Bottom Connected Direct Current Meters:—The demand for such a meter ranging up to 75 amps. was brought to the attention of different manufacturers, some of whom are now working upon its design.

2. Watthour Demand Meters:—The size and overload capacity of the scale marking received attention. It was decided to ask manufacturers to adopt the following full scale marking:—

For single phase meters, 150 per cent of full load capacity of watthour meter, full load being amps. \times volts.

For polyphase meters, 125 to 150 per cent full load capacity with a tolerance of plus 5 per cent, full load for the two phase meters being amps. \times volts \times two.

For three phase meters (3 and 4 wire) to be volts \times amps. \times square root of three. Delta voltage being used, one hundred and fifteen (115) volts or multiples thereof to

The methods of obtaining power factor from readings of reactive component meters is entered into in full detail.

Connections for obtaining approximate kv.a. hours under certain conditions are given.

Outdoor Metering Equipment

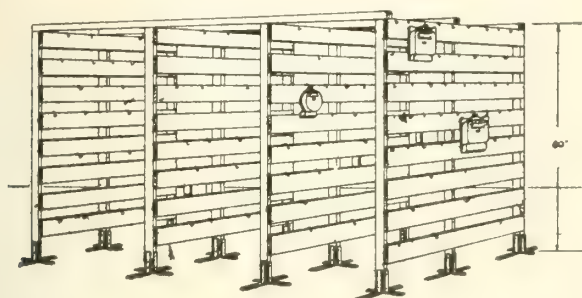
The necessity of placing instrument transformers outdoors under certain conditions was recognized, but it was considered that the actual meters should, wherever possible, be placed indoors, and in every case should be provided with a proper housing.

Maintenance of Switchboard Meters and Instruments

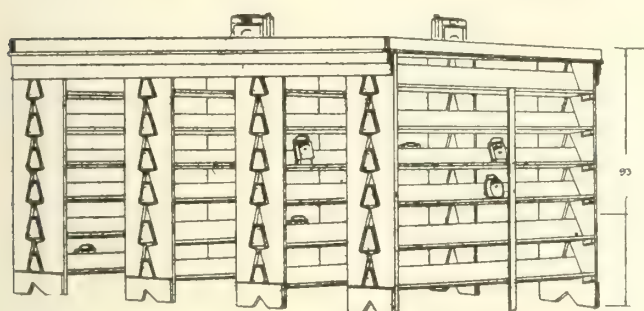
Data was collected bearing upon practice with regard to the above. This data was not very complete but showed as a general rule that the meter departments were responsible for the maintenance of switchboard meters and instruments. The installation of watthour meter on separate panels from the control and other instruments was favoured. There was a diversity of opinion with regard to testing schedule and methods.

Relay Maintenance

The majority of members of the committee reported that their meter departments were responsible for relay maintenance. It was decided to co-operate with the apparatus com-



No. 1 Capacity of 10' 0" Rack - 180 METERS per Section



No. 2 Capacity of 10' 0" Rack - 230 METERS per Section

Electric Meter Racks installed by a Member Company.

mittee in preparing future reports on this matter, as relays are primarily protective devices.

Respectfully submitted, E. Holder, chairman; E. J. Turley, P. S. Gregory, Wm. Volkman, L. W. Pratt, S. L. B. Lines, E. R. Spence, G. A. Wendt, E. G. Ratz.

Report of C. E. A. Overhead Systems Committee

Data on Range Loads showed Maximum Demand about third of Installed Capacity

The report of the National Overhead Systems Committee of the National Electric Light Association, with which we are affiliated, deals with matters of considerable interest to the Geographic Section and Allied Societies. This report will be in the hands of all the members of the C.E.A., and such parts as are of special interest to this association may be read at this time. The report of your committee, therefore, deals only with such other matters which are of special interest at this time to our own members.

Your committee is represented on the National Committee at this time by the chairman and one other member of this committee. Three meetings were held by the National Committee, two of which were attended by the representatives, who are therefore closely in touch with the work.

The present organization of the N.E.L.A. into many geographic sections makes it more possible for the sectional chairman to become thoroughly acquainted with the systems in use and the needs of the members in their respective sec-

tions. The current practice and progress made in any line can be better determined and reported, because the committee can direct questionnaires necessary to obtain the required data to the companies that are interested and able to supply the information, thus obviating questionnaires being sent out broadcast, unnecessarily bothering companies which obviously cannot supply the required data.

Your committee suggest, therefore, to its successors that they become fully acquainted with the conditions within the area of their jurisdiction, and thus be better able to serve the association.

Shortly after the formation of your committee, a meeting was held in Montreal to consider matters which seem of special interest at this time. As a result of this meeting a questionnaire was sent out. This report deals with the deliberations of the committee and the replies to the questionnaire. Your committee wishes to thank the members for so generously replying to the questionnaire.

Bare Wire for Primaries

Mr. Davies, of Montreal, asked the committee to report on the advisability of using bare wire for primary circuits. Your committee directs your attention to a report of a previous committee on this subject two years ago against the use of bare primaries. This decision the present committee fully endorses. One added reason for this decision, which the former committee did not bring out, is that while the insulation is not of much value as such, yet under certain conditions it has proven valuable in preventing injury, and it is also desirable from a legal point of view, since it shows that we have at least taken some precautions to prevent accidents. This committee recommends the continuance of the use of insulated wires in certain areas.

The Canadian Electrical Association was asked to appoint a representative to the sub-committee of the Canadian Engineering Standards Association on pole specifications. In order that the Overhead Systems Committee be in touch with the matters dealt with by this sub-committee, the chairman of this committee was appointed as the Canadian Electrical Association representative.

Pole Specifications

The questionnaire included requests for data on pole specifications. Replies to this part of the questionnaire were received from twelve companies; four reported that they buy poles under the N.E.L.A. specifications, and eight that they do not; ten desire modification in the specifications, two do not; eight buy under their own specifications, which are modified N.E.L.A. ones, Cedar Association or by inspection; four do not have their own specifications.

The replies on these points indicate the desirability of a change in the N.E.L.A. specifications. The committee will be enabled to get in touch with the various companies desiring a change, when the matter comes up for consideration from time to time in the Canadian Engineering Standards Association sub-committee.

Your committee has discussed the desirability of perfecting some device which would be more economic and also more definite in indication of overhead than the present practice of testing transformers at various intervals or keeping track of the connected load. Several expedients such as wax tubes, thermometers placed in the oil, heat-indicating paints, etc., were studied, and it was found that results obtained from these devices were not entirely satisfactory, and the readings were rather inconvenient to obtain. Two devices were exhibited before the National Committee at two of their meetings, which your committee hope to be able to have shown at this convention. These devices are easy to attach to a transformer, operate on predetermined temperature of the oil, and give a positive indication of the oil having reached this temperature. A section of transformers equipped with

such a device can be readily and quickly inspected for overload. When a transformer is found to be overloaded, further readings can be taken in order to determine time and length of such overload. Your committee has received circulars of devices which indicate a predetermined current passing. They do not take into account the temperature of the surrounding atmosphere and are not what is required for transformers

Standardizing Line Material

In regard to the standardization of line material, the companies replying were of the opinion that these materials should be standardized. Your committee has asked that the Canadian Engineering Standards Association be approached for the purpose of appointing a sub-committee to take up this matter, because in this way it would be possible to get all interests together and obtain more general standards. Your committee in reviewing the matter are of the opinion that the materials only should be standardized, each company should be left free to assemble and combine these materials in forms most economical and adaptable to the company in question. We understand that the Canadian Engineering Standard Association has now appointed a sub-committee as requested, to deal with the matter.

The replies in regard to the insulator situation do not suggest that it is feasible at this time to do much in the way of standardization. The report of the national committee deals more fully with this matter.

No particular trouble is reported as being experienced due to furnace load. Such loads are for the most part special and have to be dealt with as they come up. If any member has any special difficulty with furnace regulation, the committee will be pleased to study the matter and present what data it can on the solution of the problem.

Range and Heater Loads

The topic that entailed the most interested discussion was the question of the ability of the distribution system to carry range loads, and heater loads, and what was necessary in the way of extra equipment to carry any amount of this class of load. Due to inexact knowledge as to the character of the load imposed by ranges, the practice in regard to transformer capacity and chopper for carrying the load is quite varied among the companies.

It was thought that a suitable device that would indicate overload on a transformer was of prime importance, because then the various practices could be checked up and transformers of the correct size could be installed.

Your committee endeavoured to collect data from various sources as to the actual characteristics of the range load. Due to the war and the curtailed amount of power for sale for such use, the sale of these devices were not pushed, and the larger companies did not spend any great amount of effort to get data. We were, therefore, unable to get any recent data.

The 1917 proceedings of the N.E.L.A., Report C-19 of the Commercial Section, contains as complete a report as has so far been gotten out. This report does not cover a great variety of communities. The habits of a community largely determine the characteristics of the range load, so that a proper solution is not obtainable unless these characteristics are known. Your committee cannot give a solution which will be applicable to every community, and can only indicate lines along which the solution may be worked out, from factors which seem to be constant in the various communities.

The Society for the Electrical Development publishes a book which contains a great deal of information with respect to the range load. This data is based upon the findings of the 1917 report noted above.

Recently an article appeared in the *Electrical News* on the economical handling of the range load, which was one of the subjects of a convention held in Toronto.

A review of the above, and a number of other papers supplied by the Service Department of the N.E.L.A. headquarters, indicated that the maximum demand to be expected from any range is approximately one-half the connected load of that range.

The reports also indicate that a 10 per cent drop in the normal range voltage, that the time for the oven to reach operating temperature is increased by 75 per cent, while the kw. hours consumed in obtaining this temperature are increased by 16 per cent. In order to have satisfied customers and the most economical use of the power supplied, the voltage must therefore be kept within a range of not over 5 per cent drop from the normal range voltage.

The problem of one range is to provide transformer capacity for one-half the connected load of the range and run copper between the transformer and the range so that the drop will be within a limit of 5 per cent. Whether this transformer capacity has to be provided over and above that required for the lighting demand, or whether the lighting transformer can be used wholly up to its capacity for range load will depend upon the characteristics of the community served. In large centres where the evening meal is the big meal of the day, the demand in the winter months coincides with that of the lighting demand, so that transformer capacity will have to be supplied for taking care of the combined demand of the range and the lighting. In the smaller communities, where the noon meal is the big meal of the day the maximum of the range comes nearer noon and can be nearly disregarded as far as the lighting peak is concerned. The transformer capacity needs only to be able to take care of whichever is the greater.

When more than one range is connected in the same vicinity with another range, the opinion and findings as to the relation between the demands of the ranges diverge widely. Reports are agreed in that there is a considerable diversity between ranges. That this diversity is generally true for each day is not shown, or the possibility of there being some days when the diversity would be a great deal less. At a recent discussion of the diversity between range demands, tests were quoted that showed that although the diversity was great part of the time during the week, that a maximum demand of one-third of the connected load could be invariably expected from a group of scattered ranges.

The Diversity Factor

The replies to the questionnaire indicate a considerable variation in practice, but the general practice coincides with the above findings.

All of the companies except one, replying to this part of the question, use the same transformer for lighting and range loads.

Reported transformers capacity installed for ranges varied from capacity equal to that of ranges connected to transformer capacity of one-third the connected load of the ranges, the latter practice being the most prevalent.

In some cases this transformer capacity takes no account of the lighting load that has to be carried as well.

The opinion as to what part of the range demand might be expected on the lighting peak varied from full range demand to one-sixth of the range peak.

The recommendation of your committee as a safe practice from the experience of the reporting companies is to provide a transformer capacity of one-third the connected load of the ranges to be supplied, and to install copper between a transformer and a range to give not over 5 per cent drop for one-half the connected load of that range. Where the lighting load and the range load peaks come on the system at the same time, the transformer capacity needs to be increased as above to take care of the load, but where the range peak comes during the morning or noon the trans-

former capacity need only be provided for the range load and not to take into consideration the lighting load.

In all probability taking care of range loads will involve changing the secondary lines in portions of system where ranges are installed. Your committee wish to call your attention to a report in the 1914 proceedings (Technical Sections, pages 655 to 682), which gives a plan for figuring cost of your own system, you will be able to determine whether or not it will be more economical to survey the sections and rebuild your lines for a load to be expected in a certain period of years, rather than to rebuild your lines each time a range or ranges are added.

On most systems study along these lines, making the sales department obtain the expected business, rather than have the distribution department lag behind, delaying the increasing of the lines until the load has grown, will be found to be the most economical solution.

Respectfully submitted, O. V. Anderson, Chairman; R. B. McDonnough, A. A. Dion, G. M. Anderson, L. A. Kenyon, R. D. Harkness, John Alden.

Report of the Technical Section

Number of New Committees appointed. Advantages follow Admission of Manufacturers to Membership.

The association this year changed its scheme regarding the appointment of committees so as to bring the organization and work of committees very much in line with the new plan adopted by our affiliated association, the National Electric Light Association. This plan resulted in the appointment of a number of sections, including the Technical Section. After the appointment of the Technical Section it was decided, subject to the approval of the executive committee, to appoint the following committees: Hydraulic Power Committee, Electrical Apparatus Committee, Meter Committee, Overhead Systems Committee.

These committees were appointed and a large amount of work done, reports upon which will be submitted during the course of this convention.

It is probably advisable to call attention to the fact that we were under certain disadvantages in that we were not very familiar with the exact details of the organization of the National Electric Light Association committees, and we also suffered from various changes in personnel of the committee owing to certain properties coming under "Government Ownership." It is here perhaps advisable to suggest for the consideration of the incoming executive committee and technical section, the advisability of drawing up a constitution along lines similar to those adopted by the National Electric Light Association. This latter would have many advantages because it would definitely decide procedure.

Dealing with Local Aspect

In view of the present constitution of this association and its affiliation with the National Electric Light Association, we have to bear in mind that the work done by the National committees is naturally much more thorough and exhaustive than can be accomplished by this association, and the work of committees of the Canadian association to a large extent consists of dealing with the local aspect of affairs in conjunction with reports of the National Electric Light Association.

While discussing this question of the work of the National Electric Light Association we would particularly urge our members to study the reports presented at the Chicago convention two weeks ago. These reports will be in your hands shortly, and a few words dealing with these reports

may perhaps be inserted here. One is struck by obvious advantages of the new policy in allowing manufacturers to become members of the association as is evidenced by the very valuable contributions from technical experts of a number of manufacturing companies.

Reviewing the reports briefly the Electrical Apparatus Committee's report described what is probably a very important advance in switchboard designs in that absolute separation of phases is used, the idea of this being to obviate the possibility of short-circuit. This scheme is used in the new power plants being built both in New York and in Chicago. A report on a special committee dealing with the examination of equipment will also be of interest to our operating engineers.

Hydraulic Power Committee

A new committee appointed last year, the Hydraulic Power Committee, whose report is of great interest, indicates the wisdom of the appointment of a committee to specially consider this phase of the work, and I might here mention that the Canadian Hydraulic Committee have not made a report this year though the chairman, Mr. S. Svenningson, has attended several meetings and I will now read a letter from Mr. Svenningson dealing with this committee.

"Your committee feels that, due to the re-organization of the N.E.L.A., it will be desirable in the future that the Hydraulic Power Committee of the Canadian Electrical Association should work as a geographic section of the main committee. In this connection I may state that it is the intention of the present main Hydraulic Power Committee to distribute the work amongst the chairmen of the geographic sections in such a manner that problems of particular interest to a section will be gone into in detail by this section. It is also the intention in the future to more fully go into operating features than in the past.

"The main Hydraulic Power Committee of the N.E.L.A. has during the past year made up an extensive program which it will take several years to carry out. This program, which will be fully described in the annual report of the N.E.L.A., includes design as well as operating problems which we believe will be of great interest to the members. Future reports will, of course, also include manufacturers' statements, but these statements will not play such a dominant part as in the past.

"In conclusion we wish to urge member companies to suggest any problem, which they feel should be gone into, either by the geographic section or the main committee of the N.E.L.A."

With further regard to the Chicago proceedings the Overhead Systems Committee presents a report dealing with new line constructions; the use of much longer spans; the use of concrete poles and the question of pole treatment. Also, the sub-committee's report on construction materials is of great interest and suggests modifications to the present standards in the National Handbook.

There are other reports for which similar committees were not appointed by this association. They are the Inductive Interference, Prime Movers and Underground Systems. This latter is of general interest particularly with regard to tests and figures given dealing with overheated duct runs, a problem we occasionally have with us here in the Province of Quebec.

The reports of the various committees will be given during the Convention and I hope will be found of value to all members and also that they will promote lively and wide discussion.

Respectfully submitted,

O. V. ANDERSON,
J. H. WURTELE,
E. H. HOLDER,
S. SVENNINGSON,
R. J. BEAUMONT, Chairman.

Automatic Sub-station for Toronto Transportation Commission

One Thousand Kilowatt Capacity installed, First of it's type in Canada. A Detailed Description of the Design and Operating Characteristics.

By H. C. Sutherland.

The rapid growth of the City of Toronto during the past few years has necessitated more adequate transportation facilities than those provided by the Toronto Street Railway and the city has been forced by the expansion of its suburbs into the building of civic lines on various streets for the convenience of those living at some distance from the centre of the city. On one of these, the St. Clair Avenue line, traffic density has grown to such an extent as to render more station capacity advisable and the Toronto Hydro-Electric System has recently installed a 1,000 k.w. automatic substation to augment the energy delivered from the High Level Substation at the System.

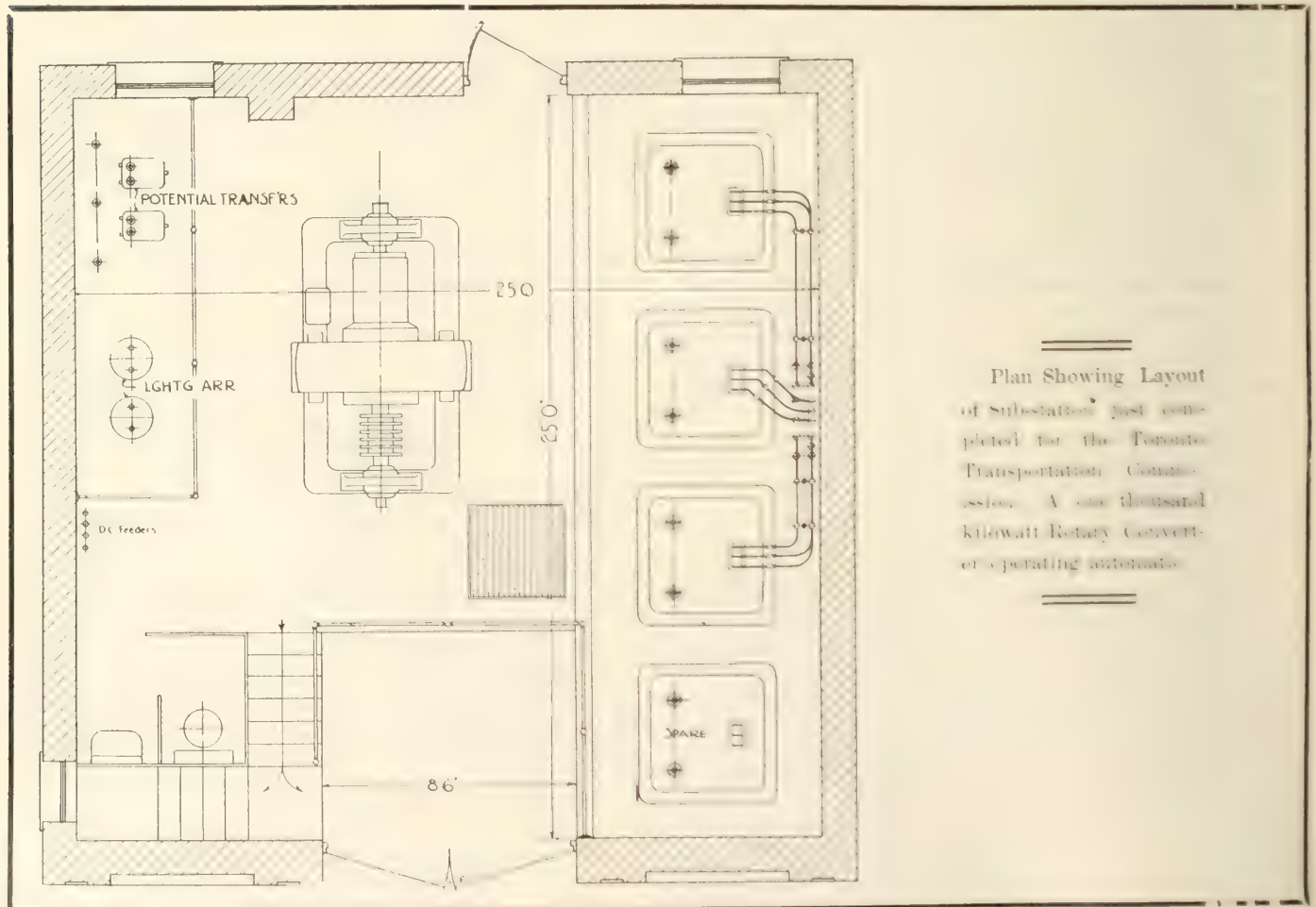
This new station is located at the corner of Ossington and Benson Avenues, one block south of St. Clair Avenue in a residential district. For this reason care has been taken to ensure an attractive building with adequate grounds. The walks are of buff pressed brick with cut stone trim, while the main floor and roof are of reinforced concrete slab construction on fire-proof steel beams. Owing to the relatively high cost of building at the time building opera-

tions were commenced, care was taken to keep the station size down to the smallest figure consistent with good design and arrangement of equipment. As actually constructed it is 25 feet square inside with main floor and basement, giving a volume of about 18 cubic feet per kw. of installed capacity. A crane is installed for the handling of the transformers and other heavy equipment. Construction and maintenance rooms are provided in the basement for the storing of supplies for these two departments, while lavatory accommodation is also available on the main floor.

General Operating Features.

The term "automatic" as applied to a converter substation implies that all operations usually performed by station attendants are carried out by means of relays, contactors and other equipment in such a manner that no supervision is required beyond the visit of a maintenance man once or twice a week. No operators are required and operation is even more certain than when controlled by hand.

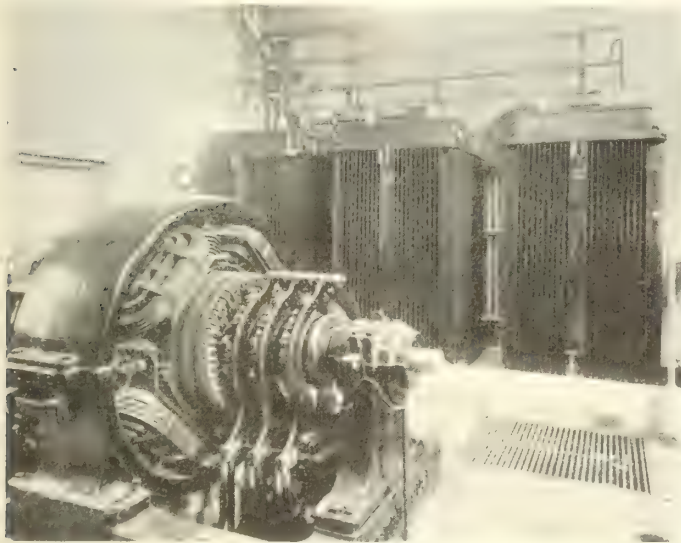
When a heavy load exists on the car line and trolley



Plan Showing Layout of Substation just completed for the Toronto Transportation Commission. A one thousand kilowatt Rotary Converter operating automatic.

voltage fails in consequence, the station will start up and will continue to run until such time as it is no longer needed and will then shut down. If required, it can also be controlled from a distant point, in this case the High Level station, by the operator stationed there, who can cut the station in or out as he pleases by the manipulation of the circuit breaker at his end of the line feeding it.

The general scheme of operation closely follows hand practice except that the judgment of the operator is replaced by mechanical features which function even more surely and rapidly than is possible manually. From the time the first relay operates until the station is in on the line is only about 35 seconds as compared with at least two or



View of Interior, Automatic Sub-station, Toronto, showing Rotary and Transformers

three minutes with hand operation. There is no possibility of error being introduced since, if a mistake should be made or some of the equipment fail to function the station will not start. Protective relays thus guard against every possible trouble due to operating or mechanical difficulties and in this respect the installation is even more completely protected than any manually operated station could be.

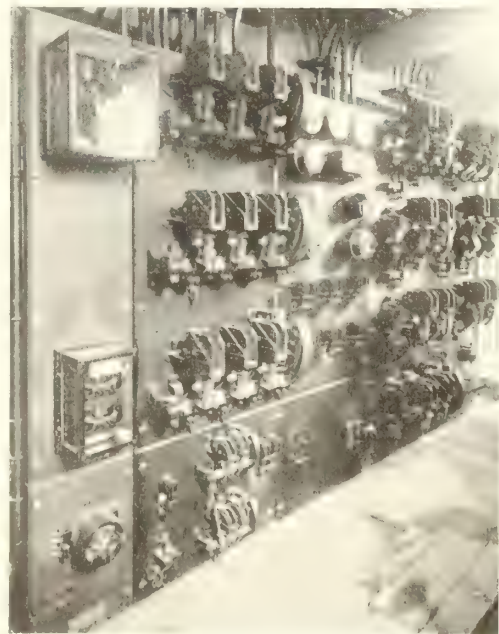
In manual operation the operator first closes his starting switch before energizing the transformers, then see that his brushes are lifted, in a commutating pole machine, after which he throws in his oil switch. This latter impresses starting voltage across the converter and the machine picks up speed and swings into synchronism. During this period the voltage across the d.c. brushes is alternating, the periods becoming longer and gradually merging into a direct current potential as synchronism is approached. This potential may be either correct or reversed and the operator by manipulation of his field switch corrects for wrong polarity by reversing his fields, letting the voltage die down to zero and then, throwing the switch back again, catching the voltage in the right direction. After synchronism and correct polarity has been obtained, the starting switch is opened, the running switch closes, the brushes lowered and the machine is ready for placing on the line which is done by closing his main d.c. breaker.

The same sequence of events is gone through in this station, each step being controlled by the one preceding and taking place as soon as it is completed. Energy is received from the High Level station through a 13,200 volt transmission line together with a tap of the system's ring mains, thus providing two means of energizing the station. On a demand for energy being indicated by the closing in

of contacts on a low voltage d.c. relay connected to the trolley circuit, the station oil circuit breaker (type E-9) closes, energizing the rotary transformers. Four of these 400 kv.a. capacity and of the single phase type, are provided, the fourth acting as a spare in the event of failure in the operating bank. Previous to the transformers being energized and assuming everything to be correct, brushes up, no over-heater bearing etc., the starting contactor is closed in, and on the oil switch being closed the machine builds up speed and comes into synchronism.

Before the running contactors can be closed, polarity has to be checked and if necessary corrected. This is done by means of an ingenious relay which tests polarity and corrects it when required and then opens the starting contactors and closes in the running.

It consists of a polarised motor having a permanent magnet field and a direct-current armature. This motor drives through reduction gearing, a drum contactor provided with four positions. The motor armature is connected across the converter commutator by means of pilot brushes. As the converter speeds up the voltage across the commutator is alternating and the relay motor armature merely tends to oscillate in consequence. As synchronism is approached the voltage merges into a direct current potential which may or may not be of the correct polarity. The relay armature then revolves in one direction or another depending upon polarity and turns the drum contactor. If correct polarity is obtained the order in which the contacts are engaged first drops out the starting contactor closes in the running contactor and then lowers the brushes. If, on the contrary the converter builds up with incorrect polarity the order of closing the relay contacts is reversed and the relay first energizes a small contactor from d.c. potential across



Control and Meter Board

polarity field contactor and throws in a similar one which reverses the fields. The d.c. voltage in consequence dies down and when it reaches zero potential the contactor which has just manipulated the field contactors, falls out and the field is again thrown back in its normal operating position. Polarity usually builds up in the right direction after this operation but should it fail to do so the same operation will be repeated three times, after which another relay will function to open the starting contactors and the machine makes a fresh start.

After correct polarity has been obtained and the machine is on its running taps, the brushes are lowered and the converter connected to the trolley bus through its main d.c. contactor and supplies energy to the line.

Overload Protection.

Heavy overloads and short circuits are of fairly common occurrence on traction net-works and must be taken care of. Grid resistances are installed which can be put in series with each of the feeders and also the machine circuit. These serve to limit overloads to the two-hour rating of the machine and are also of service in putting the machine in on the line. For their protection under short-circuit or overload conditions thermostats are provided which open the feeders or machine contactors and cut the station off the line. When the grids have cooled, the machine automatically comes in again and supplies energy as before.

Various other protective features have been incorporated into the control circuits, thus guarding against the usual troubles inherent in station work. For instance type C.O. relays are installed on the high-tension side of the transformers for short-circuit protection, the converter is equipped with thermostats which shut down the station consequent upon overheated bearings. An over-speed trip is also fitted to the rotary. These three protective features function through a lockout relay which prevents the station from starting up again until the trouble has been remedied and the relay is reset by hand. Reverse phase and low-voltage trouble is also taken care of.

The station is shut down through a current relay dropping its armature when current falls off to a predetermined value. This action operates another relay by means of

graphic wattmeter, a Bristol volt-meter (d.c.), a Lincoln demand maxicator and a watt-hour meter. These not only serve to meter the load but the graphic and recording meters also serve as a check on station performance.

Design and Installation.

The engineering department of the Toronto Hydro-Electric System is responsible for station layout and design. The building was erected by Witchall & Son., contractors and the equipment in general is of Westinghouse make, the installation of equipment except for high-tension and metering, being done by the Canadian Westinghouse Company.

Ottawa Car Co. Manufacturing Brake

The Ottawa Car Manufacturing Co., Ltd., Ottawa, Ont., are now manufacturing, under exclusive patents in Canada, the Ackley No-Staff Brake. This brake is of interest, not only on account of its efficiency, but also owing to its light weight and small dimensions. As an example of the latter characteristic, it may be mentioned that the first storage battery train operated, it is said, anywhere in the world, namely, at Havana, Cuba, was equipped with Ackley No-Staff Brakes. The platform space on these cars is extremely limited, and these brakes offered the only solution of the problem of fitting them with a brake that was efficient, powerful, light weight, and easy of operation.

The design of this brake combines the platform saving features of vertical wheel drive with the elimination of the staff.



The Ackley No-Staff Brake

The chain itself winds upon a double eccentric gear-driven drum, horizontally mounted on roller bearings and free from the evils of sprocket cutting. The direct drive from drum to brake-shoe results in expeditious brake application with a minimum of effort. The double eccentric drum provides a safe regulator feature in permitting the unwinding of the draw chain merely to the extent necessary for brake shoe clearance. It is said that the performance of this brake in foreign countries has been so uniformly satisfactory that its use abroad has been standardized. The illustration herewith gives a good idea of the compactness of the outfit.

Mr. A. E. Nicholls, secretary-treasurer of the town of Qu'Appelle, Sask., advises that it looks as if the project of an electric light plant in that town had fallen through for the present.

The Canada Gazette announces the incorporation of the Willard Storage Battery Company of Canada, Limited, with head office at Toronto. The company is capitalized at \$500,000.

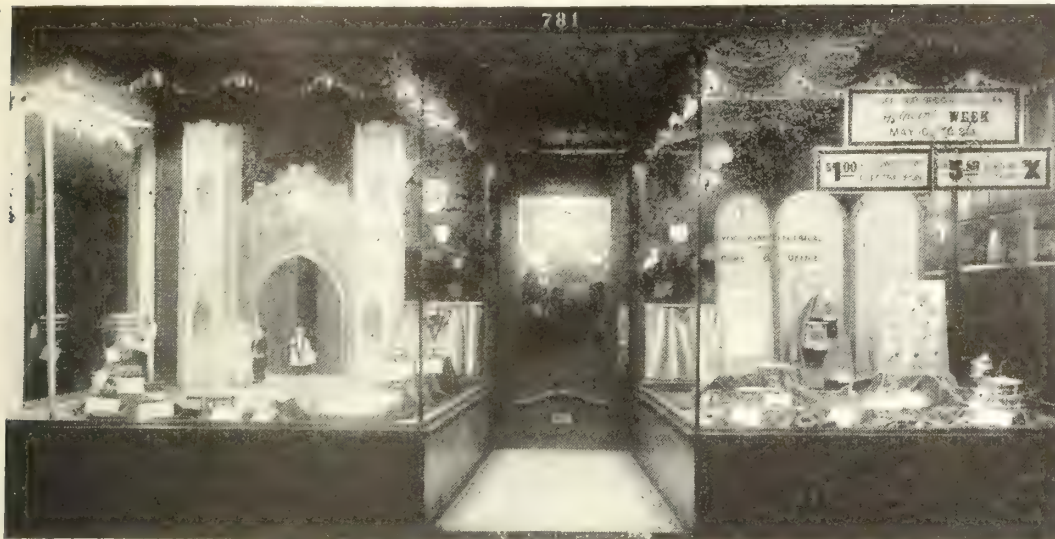


The new Automatic Sub-station Exterior.

which a time interval of between 3 and 30 minutes is interposed before shutting down takes place. By this means the stopping of a car will not affect operation nor will the station shut down through momentary fluctuations due to other causes.

Equipment.

With the exception of certain apparatus such as bus supports, potential transformers, etc. the equipment is of Westinghouse make. The rotary converter is of 1,000 k.w. capacity and of their standard commutating pole type. It is located directly on the main floor no foundations being required. The switchboard is located in the basement and comprises four 2 feet 8 inch panels mounting the various contactors, relays and other control equipment, together with a metering panel upon which are mounted, a Westinghouse



An attractive Vancouver Window Display by Electric Supply and Contracting Co. Big results from small expenditure.

Capitalizing "Ideas" in the Electrical Merchandising Field

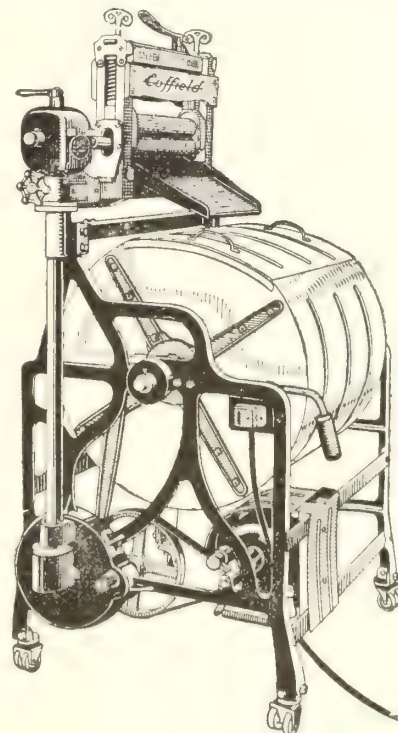
The Electric Supply & Contracting Co., Ltd., Vancouver, B. C., recently prepared a very attractive window display in connection with a special sale of Hotpoint appliances. The windows are shown herewith.

Both windows were devoted exclusively to Hotpoint appliances. The right hand window carried out the Hotpoint special design for the week—the goods being displayed on blue velvet with a background of gold and blue. The left hand window comprised a special attraction to make Hotpoint appliances appeal to the bride—the main card stating "Happy is the Bride who has Hotpoint Appliances in her home." In the background of the window was erected a miniature church which was brilliantly illuminated. At the door of the church will be seen the parson perfectly dressed in tailor made garments bidding good-bye to a beautifully attired bride and bridegroom with the words "God bless your home," the wedding pair being effectively showered with rice, the bride carrying a bouquet of orange blossoms. Hotpoint bridal gifts were neatly displayed on velvet with a description of each gift and a private card attached to each gift, "Wishing you every happiness" from "Mr. & Mrs. Jones," "I wish I were you Jock" from Harry, etc. etc.

The church and wedding garments cost this company eighty-five dollars, and throughout the week attracted a great crowd.

Is Now "Made in Canada"

The Coffield washer is now made in Canada by the Coffield Washer Company of Canada, Hamilton. The Canadian product will combine all the advantageous features in design and construction that have given this washing machine its present reputation. The illustration shows a general view of the Coffield washer. The frame is strong, rigid and compact. A motor of ample capacity is mounted inside of the frame, but completely insulated from it and fully shielded, as shown. The driving gears are encased and packed in



grease. The bearings are oilless, and it is claimed will never require adjustments or attention. An extra wide wringer swings to any desired position and locks. The control lever is within convenient reach and enables the operator to stop and reverse the wringer instantly. The tub is of copper, oscillating type, of eight sheets capacity. The interior of the tub is free from any grooved parts, so that it is easily cleaned and there is a minimum of wear on clothes. The company guarantee the machine fully, as they claim that nothing but the finest materials are used in its construction.

Whatinell, Indeed?

When the workmen own the workshops;
And the mail clerks own the mails—
And the grocery clerks the groceries;
And the railroad men the rails;
When the preachers own the pulpits,
And the pressmen own the shops;
And the drillers own the oil wells;
And the jails are owned by cops—
When conductors own the street cars
And each driver owns his bus;
Will you tell us common people—
Whatinell becomes of us?

—Trumbull Chase

Outline of New Agreements between Municipalities and B. C. E. R. Company

An outline of the new agreement now pending between the city of Vancouver and surrounding municipalities with the British Columbia Electric Railway Company, was given to the members of the Electric Club of Vancouver at its luncheon meeting quite recently by Mr. Geo. Kidd, general manager of the company.

Mr. Kidd stated that it was absolutely necessary that the position of the company be stabilized if they wished to raise money for further development. The proposed agreement, which has been before the various municipalities for some time, is based on the principle of "service at cost." If the agreement is ratified by the various parties interested, a firm of chartered accountants will immediately make and set a value on the equipment and holdings of the company to determine whether or not they are earning 6 per cent on the investment. This valuation will be purely a book valuation, according to the offer of the company. Cash invested, only, will be considered; no amount will be allowed for good will nor for franchises. If the company is found to be earning 6 per cent on its investment, then the present basis stands. If not, then rates will be raised towards the maximum agreed upon, until a 6 per cent revenue is attained. Light and gas will come into the calculation the same as power and street railway service. There will be a minimum charge of 50 cents per month in the light and gas services.

At the present the draft agreement is only being taken up with the city. Later it will be taken up with the other municipalities, the course being contingent on completing the agreement with Vancouver city. In the meantime the company has offered the municipality of Point Grey a seven-cent cash fare, with a seven and one-half cent settlers' ticket, carrying transfer privileges to any part of the city of Vancouver. These rates would be a maximum. In the general agreement with the city, if more revenue is found to be necessary, there is to be a board of arbitration, which will go into the whole matter and find where rates are to be increased. The rate for new capital raised after June 30th is to be 8 per cent, whether by sale of bonds or other money invested by the company. There is a stipulation, however, that this 8 per cent rate on new capital is to be varied by the board of arbitration later, but not to be made lower than 6 per cent.

Adjustment Every Three Years

One of the chief features of the agreement is that an adjustment is to be made every three years. The accountant chosen for the work will find what the cost of operation has been, and what has been made in the period. If there is a surplus, half of it is to be paid to the company as an incentive to good service and efficiency. The other half is to be applied to reduce rates in the next three year period. In addition, the rates will also be lowered by the whole amount of the surplus gained in the first three year period. For example: Should there be a surplus of \$100,000 in a three-year period, \$50,000 would be taken off the estimated earnings of the next three-year period and the basis would also be reduced by another \$100,000, or \$150,000 in all would be deducted from the revenue and the rates struck accordingly.

Privileges of Purchase

Privileges of purchase by the city are also defined. Previously only the street railways were included in the power the city had to buy at the end of every five years. The outside municipalities had the right only at the end of long term agreements. But no corporation had the right to buy the light, power, gas or inter-urban properties. The proposed new agreement gives the right at the end of the three-year period to buy either the street railways, or the railways, light, power and gas services. No privilege is given of buy-

ing the power, light and gas, leaving the less profitable factors, the street railways, on the hands of the company. The company refuses to be left saddled with the least profitable portion of the property.

Penalties of \$3,000 a day are provided for failure to give service, excepting for causes beyond the control of the company. The franchise, as proposed, is to run for 12 years. A further conference is then provided for, to draw up any desired amendments. The whole purpose, as stated by Mr. Kidd, is to stabilize the affairs of the company so that money can be raised for further needed expansions. The 6 per cent, it is pointed out, is not to be considered as interest but as a rate of return on the invested capital. For instance, the rates of interest now being paid by the company are as follows: On bond issues, 4 and 4½ per cent; on 1/3 of stock, which is cumulative and perpetual, 5 per cent; on 1/3 of the stock, which is preferred, 6 per cent, and on the other third, which is deferred stock, 8 per cent. Objection is taken to one criticism, that the proposed agreement is perpetual. In view of the provisions for an arbitration board every three years, and a conference at the end of 12 years to amend it the agreement, it is held, cannot be called perpetual.

Hoover Sweeper awarded Medal

The Hoover Suction Sweeper Company of Canada, Limited, Hamilton, Ontario, Canada, announces the receipt of a medal emblematic of highest honors at the Royal Sanitary's Institute's Health Exhibition in Birmingham, England. The award was made to Hoover in competition with every known make of electric sweeper or vacuum cleaner.

The Royal Sanitary Institute, founded in 1875, under the Public Health Act, has for its purpose the education of the public to the practicability, hygiene and economy of household utensils and equipment. The Earl of Plymouth is president of the organization. His Majesty the King is patron. Judges are selected from the foremost technical and scientific experts of the British Isles, and every phase of the exhibition is conducted with thoroughness and dignity befitting the distinction of the officials.

Some idea of the demands of the judges may be gained from the fact that in one line of apparatus no award was made, the most efficient machine examined being below the standards of the engineers who passed upon the entries. The Hoover not only met the requirements of its class but attracted unusual laudatory comment for its complete efficiency, durability and appearance.

Winnipeg Electrical Men off to Continent

Mr. H. W. Billing, district manager Northern Electric Company, who has charge of the Winnipeg, Regina, and Calgary offices, and Mr. W. T. Hunt, stores manager, Winnipeg office, sailed from Montreal for England on the first of July on the "Melita." Mr. Hunt is going home on account of having recently lost his father. Mr. Billing is going on a much deserved vacation, and will be the guest of Mr. Hunt whilst in England, at Lacock, Wiltshire. The heads of the departments of the three offices presented Mr. Billing with a steamer trunk before his departure. Mr. Billing plans to visit Scotland, Ireland, and France, as well as England. They both hope to return during the latter part of August.

An Arbitration Board, composed of Sir Adam Beck, Sir Thos. White and Mr. Hume Cronyn, M.P., has been formed to determine the price, and other details, the city of Toronto will pay the Toronto Street Railway Co., for its equipment when its franchise expires next September. Mr. Cronyn will be chairman of the Board, while Sir Adam Beck will represent the city and Sir Thos. White the Street Railway Company.

Current News and Notes

Antigonish, N.S.

The Antigonish Electric Co., Ltd., Antigonish, N.S., has secured the contract for electrical work on a Home recently erected for St. Martha's Convent, Antigonish, at a cost of \$175,000.

Galt, Ont.

Work has been started for the new Hydro-electric sub-station and Public Utilities building to be erected on Dickson St., Galt, at an estimated cost of \$160,000.

High River, Alta.

The new wireless station, recently erected at High River, Alta., is now in operation.

London, Ont.

Messrs. Taylor-Campbell Electric Co., 237 Dundas St., have secured the contract for electrical work on a school building to be erected at London at an estimated cost of \$165,000.

The Knowles Electric Co., 544 Talbot St., have been awarded the contract for electrical work on a high school to be erected in London, Ont., at an estimated cost of \$308,000.

Niagara Falls, Ont.

The Central Electric Co., 498 Victoria Ave., Niagara Falls, has been awarded the contract for electrical work on a new school to be erected on Temperance St., at an approximate cost of \$110,000.

Pt. Robinson, Ont.

The Hydro Appliances, Limited, recently incorporated with a capital of \$200,000., have purchased the plant formerly occupied by the Dominion Cannery, Ltd., at Port Robinson, Ont., where they will manufacture electrical appliances.

St. Vital, Man.

Messrs. McDonald & Willson Lighting Co., 309 Fort St., Winnipeg, have been awarded the contract for electrical work on a new school which is to be erected at St. Vital, Man., at an estimated cost of \$60,000.

Saskatoon, Sask.

The Wheaton Electric Co., 315 Twentieth St., W., Saskatoon, Sask., have been awarded the contract for electrical work on an addition to be built to the Engineering Building, University of Saskatchewan, at an estimated cost of \$90,000.

Toronto, Ont.

Officers and members of Ionic Lodge recently took advantage of his presence in the city to tender him a true Masonic welcome. Many prominent members of the craft were present for the event, which included degree work and a banquet.

Messrs. Bennett & Wright, 72 Queen St., E., have been awarded the contract for electrical wiring on a new Live Stock Arena to be erected on the Exhibition Grounds at a cost of \$1,000,000.

Mr. H. E. McLeish, electrical engineer and contractor, has been awarded the contract, by the Board of Education, for the installation of the complete new power and light service and control equipment in the Park School, Toronto.

The Mather Electric Company has just opened a store at 1479 Yonge St., where they will carry on the business of electrical contractor-dealers.

Messrs. J. A. Ash and Fred Holmes, electrical contractors, have combined their business interests and will in

future carry on an electrical contractor-dealer business at 282 George St.

Mr. R. B. Morley, general manager and secretary-treasurer of the Ontario Safety League for the past seven years, has resigned his position to become secretary-treasurer of the Industrial Accident Prevention Association, an organization formed under the authority of the Workmen's Compensation Act. Mr. J. F. H. Wyse, formerly Organizer and Engineer of the Safety League, has been appointed to fill the vacancy caused by Mr. Morley's resignation. The Executive Committee of the Safety League has made Mr. Morley honorary secretary.

Trail, B.C.

The West Kootenay Power and Light Co., Trail B.C., have been awarded the contract for electrical work on a new Presbyterian church that is being erected there at a cost of \$25,000.

Vancouver, B.C.

Messrs. Mundy, Rowland & Co., Standard Bank Bldg., Vancouver, have been awarded the contract for electrical fixtures and wiring on a new court house to be erected at Prince Rupert, B.C.

Mr. W. W. Fraser, 602 Hastings St., W., Vancouver, has been awarded the contract for electrical work on a store building being erected at 2440 Granville St., S., for Mr. F. A. Wilson, 1245-13th Ave., W., Vancouver.

The Jarvis Electric Co., 579 Richards St., Vancouver, have been awarded the contract for electrical work on an addition to be built to the Nurses Home and St. Paul's Hospital, Vancouver, at an estimated cost of \$54,000.

Walkerville, Ont.

The Peter Smith Heater Company, Detroit, Mich., have opened a branch at Walkerville, Ont. This company manufactures heaters for radial and street cars.

Welland, Ont.

The Canada Gazette announces the incorporation of Hydro Appliances, Limited, with a capital of \$105,000. The head office of the company is at Welland, Ont.

Windsor, Ont.

The McNaughton McKay Electric Co., Windsor, Ont., have been awarded the contract for electrical work on a new police station being erected at City Hall Square, Windsor, at an estimated cost of \$175,000.

The contract for electrical work on the new school being erected on Victoria Ave., Windsor, Ont., at an estimated cost of \$361,225, has been awarded to the firm of Hatzel & Buehler, Inc., 2631 Woodward Ave., Detroit, Mich.

Winnipeg, Man.

The Winnipeg city council recently awarded contracts for street lighting supplies to the Canadian Westinghouse Company, including regulating transformers and fixtures and series automatic cut-outs.

Mr. A. W. Rodger, chairman of the Southland Electric Power Board, Invercargill, N.Z., is visiting Ontario cities with a view to placing orders for electrical equipment for use in New Zealand.

The Star Electric Co., 185 Lombard Ave., Winnipeg, have been awarded the contract for electrical work on a new bank being erected at William Ave. and Main St., Winnipeg, for the Union Bank of Canada.

The annual report of the Nova Scotia Tramways & Power Company, covering the year 1920, shows a deficit of \$114,896, compared with a profit of \$66,891 for the previous year. This result is due largely to a 20 per cent increase in wages and increased cost of coal and other materials. Fares have been increased to 7 cents, or 6¼ cents where tickets are sold, which, with an expected increase in lighting rates, gives a brighter outlook for the coming year.

Mr. A. J. Morrison, 269 Albany Ave., has been awarded the contract for the electric wiring of three residences being erected on Westmount Road for Messrs. J. T. & H. Hutson, 43 Victoria St., at an estimated cost of \$30,000.

Canadian—30 years old with twelve years electrical experience and three years technical training, desires position with an electric light company; seven and a half years in the generating department of one of the largest electric light corporations in the United States; thoroughly experienced on General Electric and Westinghouse turbines and control apparatus, Terrill Regulator Rectifiers and all types of central and sub-station apparatus. Also experienced on station maintenance and line costs constructing. At present employed at Boston, Mass. Would go anywhere in Canada. Apply Box 621, Electrical News, Toronto. 13

POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 600, Electrical News, 13 Toronto.

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	75	3	25	550	480	Westg.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	60	550	970	Westg.
Used	2	50	3	25	550	720	Westg.
New	2	35	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	For & Hm.
"	2	30	3	25	550	750	F.M.
Used	1	25	3	25	550	750	C. G. E.
New	1	25	3	25	550	715	Lanc.
New	1	15	3	25	550	1450	Westg.
"	1	15	3	25	550	750	Lanc.
"	3	15	3	25	550	720	Westg.
New	2	13	3	25	550	700	Lanc.
Used	1	7½	3	25	220	1500	Tor. & Hm.
"	1	7½	3	25	550	1450	C.G.E.
New	1	7½	3	25	550	725	Westg.
Used	1	7½	3	25	550	700	Lanc.
New	1	5	3	25	550	1440	Excelsior
Used	1	5	3	60	200	1120	Westg.
New	2	3	3	25	550	1500	Lanc.
"	4	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
Used	1	2	1	60	110	1750	Wagner
New	2	2	3	25	550	1500	Lanc.
New	2	2	3	25	550	1440	Excelsior
"	2	2	3	25	550	1425	Lanc.
New	1	2	1	25	110	1400	Wagner
"	1	1½	1	25	110	1420	Wagner
New	1	1	1	60	110	1750	Wagner
Used	1	1	3	25	220	1500	Tor. & Hm.
Used	1	1	1	25	110	1400	Wagner
New	1	1	1	25	110	1440	Wagner
"	1	1	3	25	550	1425	Lanc.
Used	1	1	3	25	220	710	C. G. E.

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The following Books are Offered Subject to Previous Sale:

- A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published in 1912 by Renouf Publishing Company. 248 pages, illustrated. Price \$1.50.
- Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price \$2.50.
- Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price \$2.50.
- Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, published in 1917 by McGraw-Hill Co., Inc. 285 pages, illustrated. Price \$2.50.
- Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price 50c.
- Electric Railway, by A. Morris Buck, M.E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated.
- "Engineering Electricity," by Ralph G. Hudson, S.B., 190 pages illustrated. Published in 1920 by the John Wiley & Sons, Incorporated. Price \$2.00.
- Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price \$1.50.
- Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price \$3.00.
- "How to Sell Electrical Labor-Saving Appliances," by Electrical Merchandising, first edition, 115 pages, illustrated. Published in 1918 by McGraw-Hill Book Company, Inc. Price \$1.00.
- Practical Electric Illumination, by Terrell Croft. First edition, published in 1917 by the McGraw-Hill Book Co. 225 pages, illustrated. Price \$2.00.
- Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price \$4.50.

- Principles of Electrical Design—D.C. and A.C. Generators, by Alfred S. ... Published in 1910 by McGraw-Hill Book Co. 365 pages, illustrated. Price \$3.00.
- Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price \$2.00.
- Radiation, Light and Illumination, by Steinmetz. Published in 1900 by McGraw-Hill Book Co. 300 pages, illustrated. Price \$2.00.
- "Storage Batteries," by C. J. Hawkes. 157 pages, illustrated, published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.
- Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Published in 1917 by Longmans-Greene & Co. 102 pages. Price \$1.00.
- Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.
- "Theory and Calculation of Transient Electric Phenomena and Oscillations," by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.
- The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.
- The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.
- The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand ... Price \$2.00.

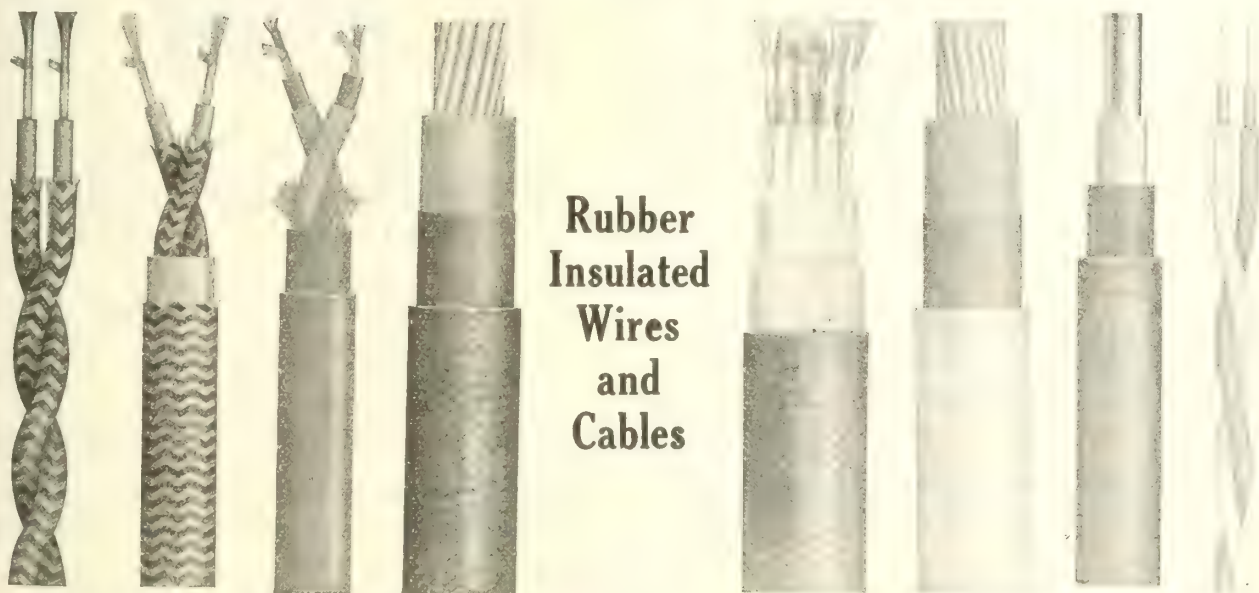
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347 Adelaide St. W., Toronto, Ontario

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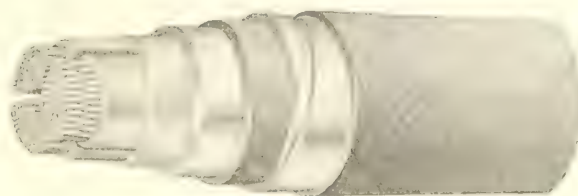


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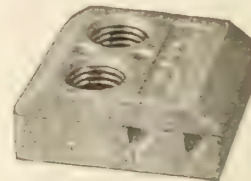
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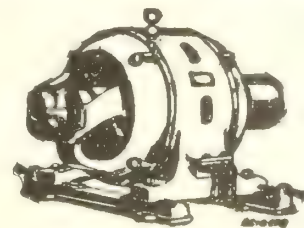
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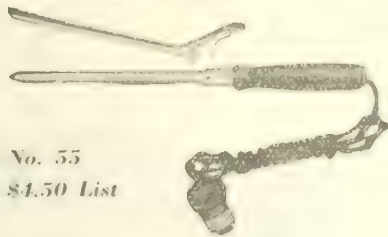
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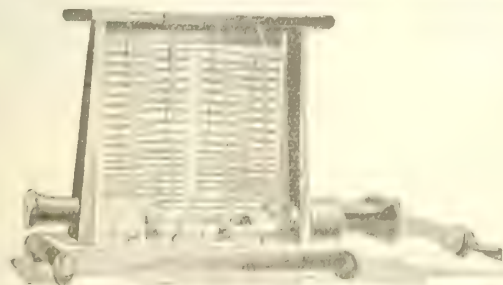
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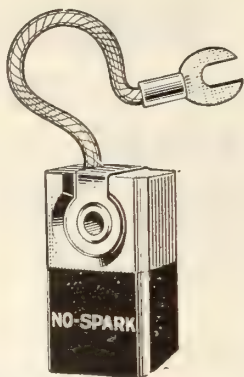
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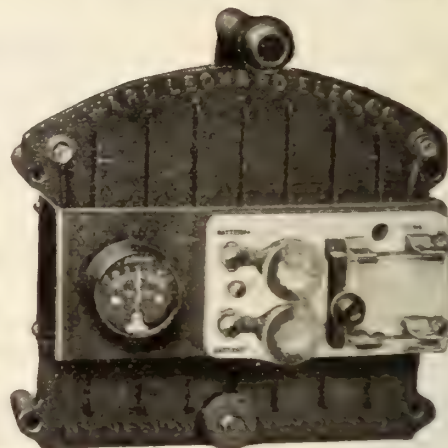
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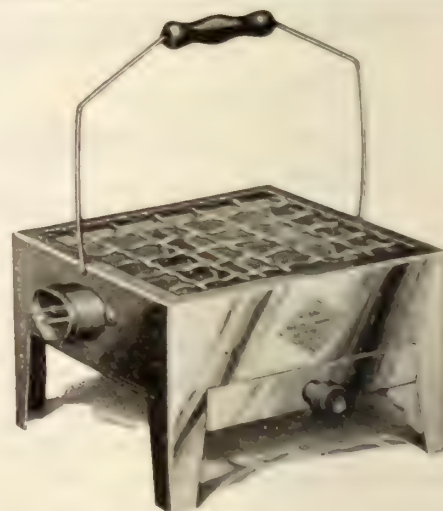
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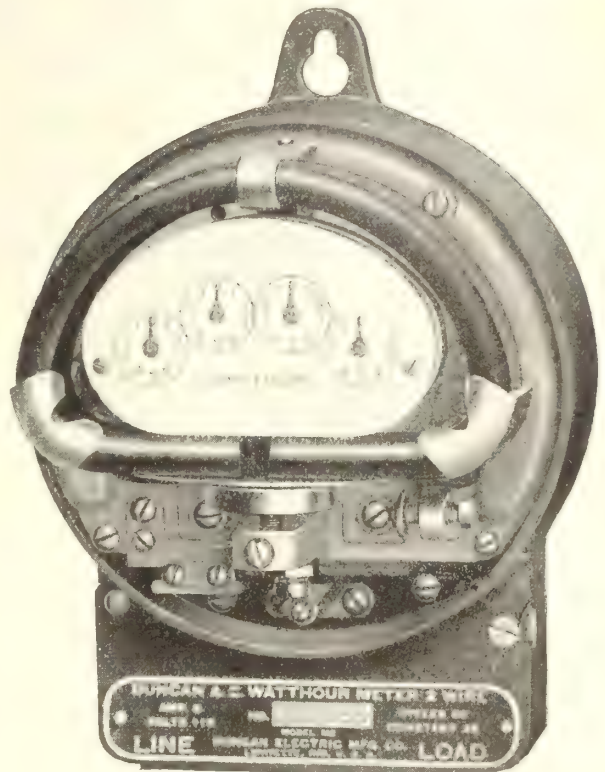
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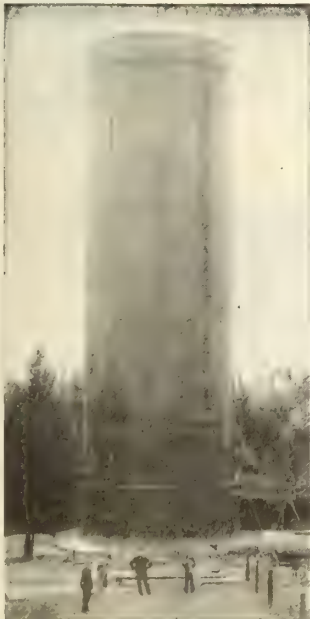
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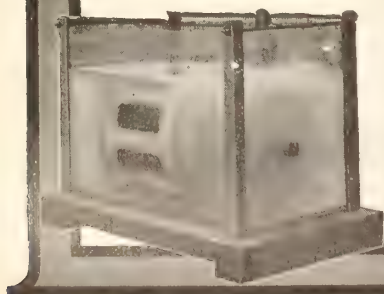
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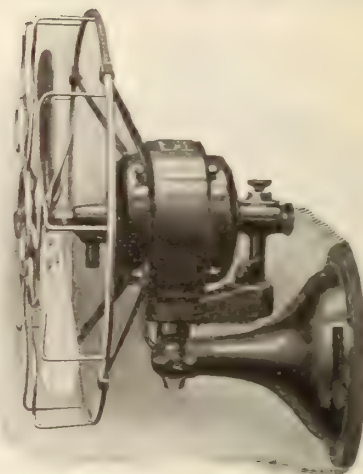
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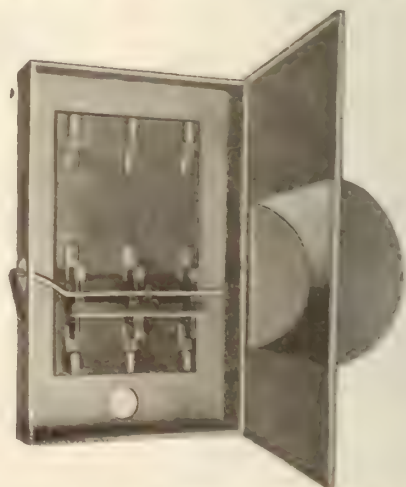
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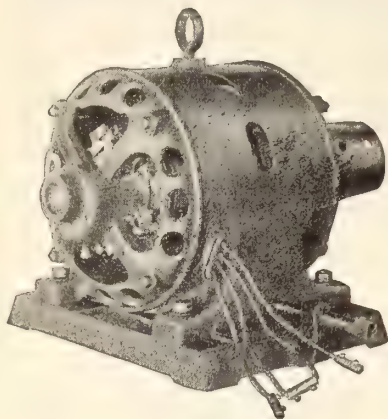
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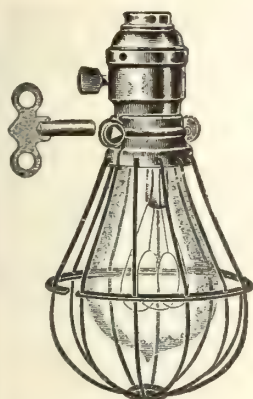
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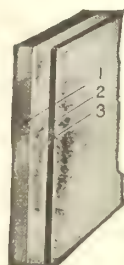


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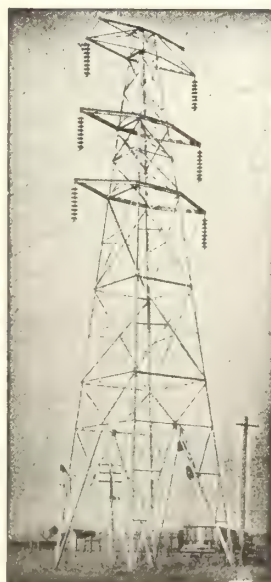


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If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

Write or Phone our Canadian Agent:

FRANK T. GROOME

1710 Royal Bank Building,
Cor. King and Yonge Sts. TORONTO.

Phone Ad. 106

JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.

WALPOLE ARMALAC

AND

Electrical Insulating Liquids and Compounds

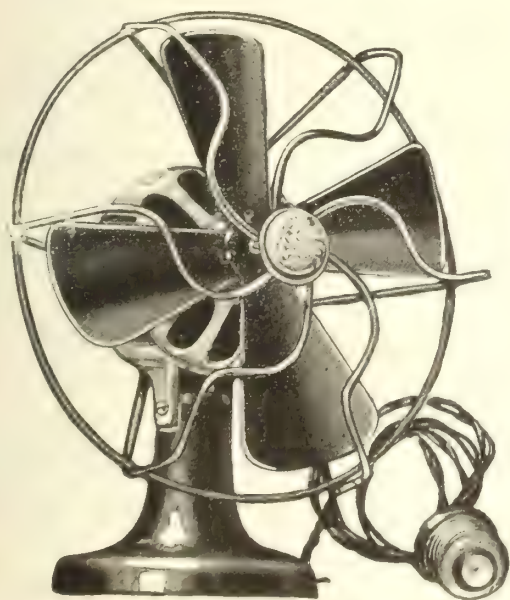
WALPOLE products have been the recognized standard of efficient insulation for electrical apparatus since 1892.

WALPOLE products cover a complete line of Insulating Varnishes and Compounds meeting every requirement of the electrical industry.

Stocks carried by all reputable Electrical Jobbers.

Robertson Chemical Company
CLEVELAND, OHIO

Canadian Representative
H. B. HUTCHINGS, 14 Lincoln Ave, Montreal



Polar Cub ELECTRIC FAN

Six in. Fan Model D, 2 speeds, \$10⁵⁰ Retail
Nine " " " \$16⁵⁰ "

The Last even Days

of June cleaned up jobbers stocks of fans. Our factory at New Haven is working night and day, BUT -- you run a risk of missing good profits if you don't order your Polar Cubs TO-DAY.

Wire or phone at at our expense.

DO IT NOW

THE A. C. GILBERT-MENZIES CO. LTD.
439 King Street West TORONTO

Manufacturers of Gilbert's Erector—Toy Electrical Sets—Toy Motors, etc.
Agents for Gilbert's Polar Cub Fans and Electrical Specialties

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Kent Brothers
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Canadian General Electric Company
Canadian Krantz Manufacturing Company
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Electrical Development & Machine Co.

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Duncan Electrical Company
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Hydeville Slate Works.

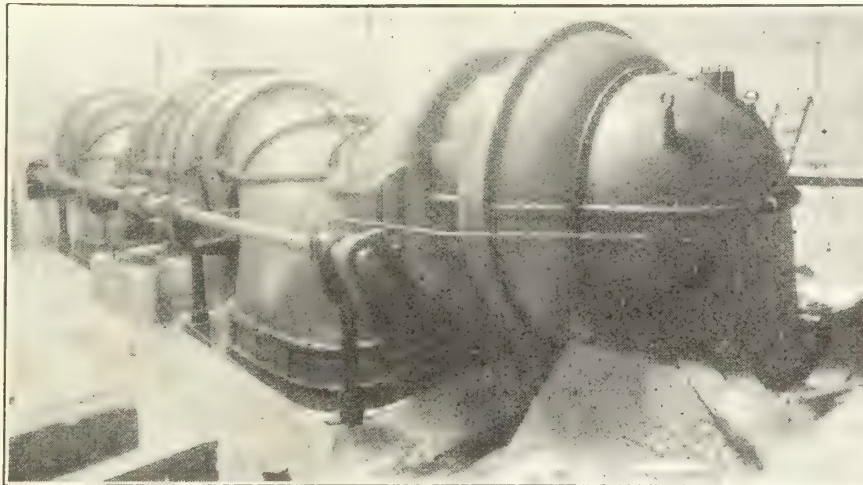
SOCKETS
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McDonald & Willson, Ltd., Toronto
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Northern Electric Company

THIS TRADE MARK



IS YOUR GUARANTEE

Made in Canada

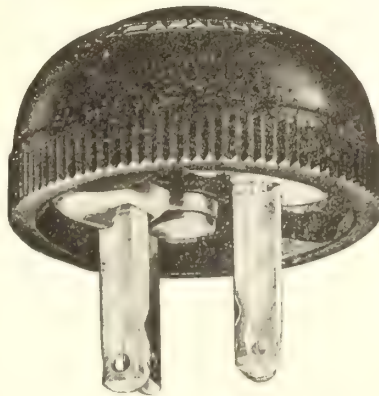
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TurbinesHydraulic
GovernorsTurbo
PumpsHigh
EfficiencySubstantial
ConstructionContinuous
Service

The Largest Water Wheel Manufactured in Canada.

BOVING HYDRAULIC & ENGINEERING CO., LIMITED
LINDSAY - ONTARIO

*International***Multum in Parvo**

Made of Composition Material, Practically Unbreakable. A twist of the fingers makes it fit instant Parallel, Tan-



dem or Right Angled Slots in Attachment Plugs or Receptacles. Being something new and good, of course WE stock it.

*The Paraline Convertible Cap***INTERNATIONAL MACHINERY & SUPPLY CO., LTD.**

421 St. James Street The Electrical House MONTREAL, Que.

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Canada Wire & Cable Company
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McDonald & Willson, Ltd., Toronto
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Phillips Electrical Works, Ltd., Eugene F.
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WIRING DEVICES

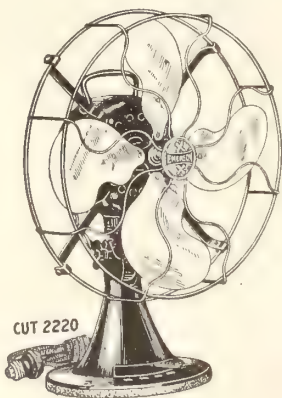
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EMERSON FANS

Give Lasting Satisfaction

Produce the most powerful breeze
and in doing so consume less current
than any other fan.

You will be delighted with the quiet running EMERSON and just as enthusiastic as we are with its speed regulators and oscillating mechanism. Every EMERSON carries a five years factory to user guarantee.

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McDONALD & WILLSON LIMITED

Sole Distributors in Ontario of Emerson and Northwind Fans—
Lighting Fixtures, Electrical Supplies and Appliances

347 YONGE STREET

TORONTO

Electric Fixtures

Meter Cases, Heater Bodies,
Fan Blades, Etc., can all be
made in



More Easily and Economic-
ally than in brass or copper

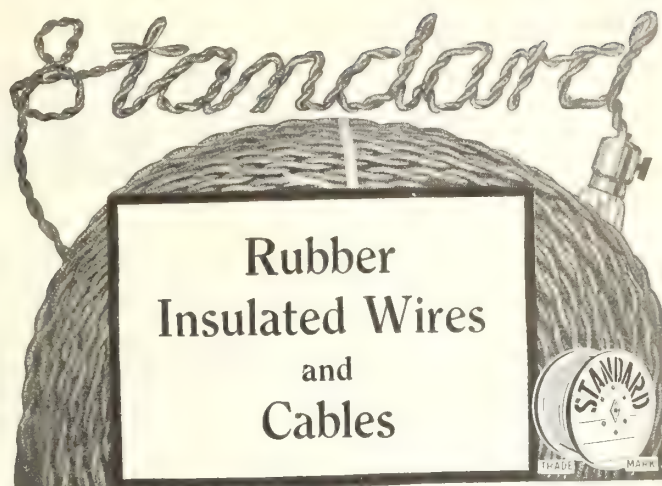
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of London, England

Canadian Office:
263-267 Adelaide
St., West, Toronto



Eastern Agents:
Spielman Agencies
Montreal



**Rubber
Insulated Wires
and
Cables**

include a wide variety of types to meet every condition of service. These types include, in addition to wire for ordinary interior wiring, a complete line of special make-ups such as Brewery Cord, Theatre Cable, Elevator Cable, Tree Wire, Etc.

For complete information write our
nearest office

**Standard Underground Cable Co.
of Canada, Limited
Hamilton, Ont.**

Montreal, Toronto, Seattle, Wash., Winnipeg.

Manufacturers of Bare and Insulated Electric Wires and Cables
of all kinds, also Cable Terminals, Junction Boxes, etc.

Nine Reasons for Using the Robertson Patent Screw

FIRST—It is driven with about half the exertion required in driving the ordinary slot-headed screw, all the power used is concentrated in turning the screw.

SECOND—It does not require to be started with a hammer, and may be started and driven with one hand.

THIRD—It is impossible for the driver to slip out of the socket and cut the finger or disfigure costly furniture or woodwork.

FOURTH—The screw cannot wobble, as it is held fast in a line with the driver, and consequently goes in true and straight.

FIFTH—The screw lasts longer, as there is no wear on the head, this part will last as long as the body of the screw, which is practically indestructible.



SIXTH—Practically adapted for long screw driver and difficult work, and can be driven in overhead work as readily as on the bench.

SEVENTH—For overhead work—electric wiring, or work in difficult places, it practically cuts the work in two, and eliminates all danger of the driver slipping and coming in contact with live wires.

EIGHTH—It can be driven at any angle, because the screw fits the driver and becomes, as it were, one solid piece with the driver.

NINTH—It removes entirely the possibility of ragged looking heads, which are not only unsightly, but cut the hands and destroy the clothing.

The P. L. Robertson Mfg. Co., Ltd., Milton, Ont.

One of the
drivers
supplied
--FREE--

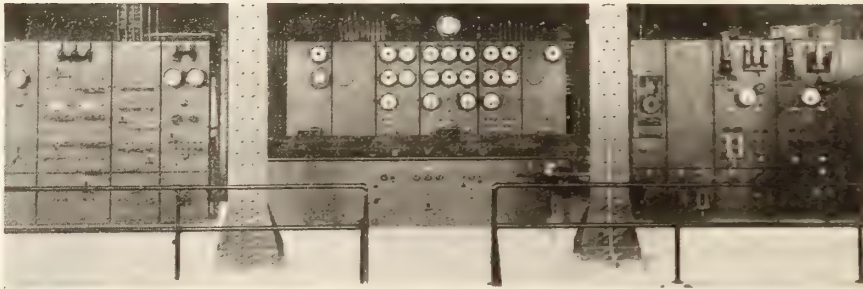


Westinghouse

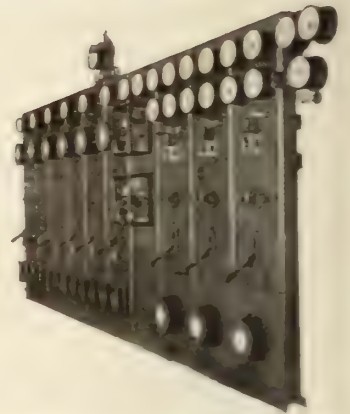
- - SWITCHBOARDS - -



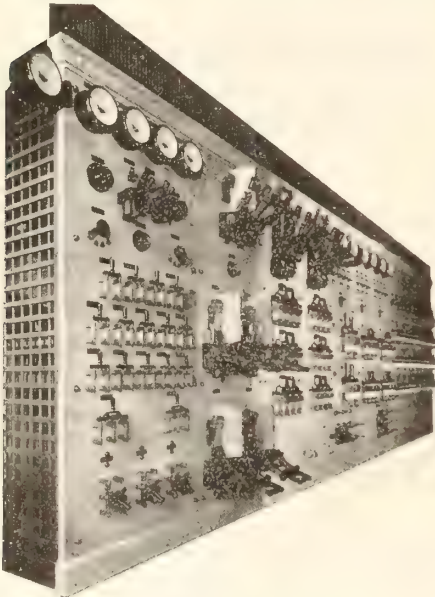
Signal Pedestal



Hydro-Elec. Power Commission of Ontario, Healy Falls—Part of Switchboard



Man. Gov't Hospital Switchboard



Dominion Parliament, Ottawa, Switchboard

Westinghouse Switchboards

The switchboard and its auxiliaries may be termed the brain and nervous system of the power plant, indicating, recording and correcting conditions in all parts of the system.

The design of the switchboard, in the broad sense, is intimately connected with the layout and electrical design of the plant as a whole.

The proper consideration and appreciation of the numerous factors involved, calls for special engineering skill and experience, and the materials and workmanship employed in construction should be of the best.

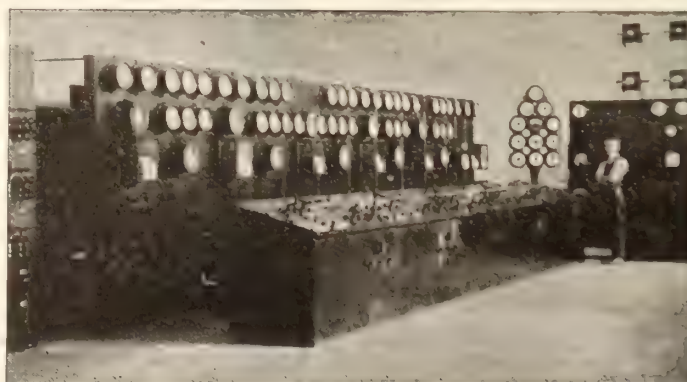
Since pioneer days in the electrical industry the name Westinghouse has been associated with leadership in this field and in Westinghouse equipment to-day the purchaser obtains the benefit of the engineering skill and manufacturing knowledge gained in the design and installation of thousands of switchboards and control equipment for all classes of service.



Contactor Panels, first Automatic Sub-station in Canada. Toronto Transportation Comm.



Substation Toronto Trans. Comm



Laurentide Power Co.—Corner of Control Room



Control Pedestal



Canadian Westinghouse Co., Limited, Hamilton, Ont.

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CALGARY, Canada Life Bldg.

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FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.

A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

Phones:
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Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

The Sign of Efficiency

MORSE DRIVES

Positive as Gears

THE MORSE "ROCKER JOINT"

Longer Life

The Sign of Durability

Flexible as a Belt



Save power and space

Send us your transmission problems

Jones & Glassco Reg'd
Canadian Agents

Bank of Hamilton Bldg.
TORONTO

St. Nicholas Building
MONTREAL

USED ELECTRIC MOTORS

IN STOCK APRIL 24th

550 Volts 3 Phase 60 Cycle			
1 H.P.	1800 RPM.	Westg.	
3 "	1800 "	C.-Wheeler	
5 "	1800 "	A.C.B.	
5 "	1200 "	C.G.E.	
5 "	900 "	C.-Wheeler	
7 1/2 "	1800 "	Thomson	
7 1/2 "	1800 "	C.-Wheeler	
7 1/2 "	1200 "	Thomson	
7 1/2 "	1200 "	Amjere	
7 1/2 "	900 "	Westg.	
10 "	1800 "	C.G.E.	
10 "	900 "	C.-Wheeler	
15 "	1200 "	C.G.E.	

ALTERNATING CURRENT

15 "	1200 "	A.C.B.
20 "	1200 "	A.C.B.
20 "	1200 "	C.-Wheeler
25 "	1200 "	Westg.
25 "	900 "	C.G.E.
30 "	900 "	Fairbanks
550 Volts 3 Phase 60 Cycles		
35 H.P.	900 RPM.	C.-Wheeler
50 "	900 "	A.C.B.
50 "	900 "	Westg.
75 "	900 "	Westg.
100 "	900 "	C.G.E.
300 "	720 "	Westg.

220 Volts 3 Phase 60 Cycle			
5 H.P.	1800 RPM.	Watson	
7 1/2 "	1800 "	A.C.B.	
10 "	1200 "	S.G.E.	
10 "	900 "	A.C.B.	
75 "	900 "	Westg.	
75 "	720 "	Westg.	
100 "	720 "	Fairbanks	
2200 Volts 3 Phase 60 Cycle			
50 H.P.	1200 RPM.	A.C.B.	
100 "	720 "	C.G.E.	
200 "	514 "	C.-Wheeler	

1—75 K.W. 2300 volts 60 cycles 3 phase 900 rpm. G.E. revolving field type generator.
1—250 K.W. 600 volt 60 cycle 2 phase 600 rpm. C.G.E. revolving field type generator

TRANSFORMERS

3—15 KV.A. 2200-550 volts 60 cycle C.G.E.
2—30 KV.A. 2200-220/110 volts 60 cycle Wagner
2—200 KV.A. 2200-220/110 volts 60 cycle Packard

DIRECT CURRENT MOTORS AND GENERATORS

110 VOLTS			
6 H.P.	1850 RPM.	C.G.E.	
6 KW.	1465 "	Westg.	
8 H.P.	1200 "	Union	
10 "	700 "	G.E.	
11 "	700 "	Westg.	

220 VOLTS			
20 H.P.	925 RPM.	C.G.E.	
50 "	950 "	Westg.	
90 "	925 "	Westg.	
100 "	650 "	Bullock	

500 VOLTS			
10 H.P.	1100 RPM.	A.C.B.	
10 "	1400 "	C.G.E.	
20 "	1100 "	Westg.	
25 "	1100 "	Westg.	
30 "	1100 "	Westg.	
40 "	1100 "	Westg.	

All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

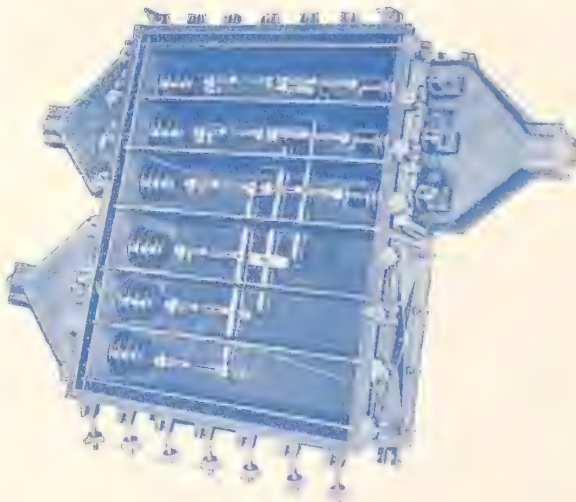
ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL

A Distribution Box

For 15,000 Volts



G & W style "C" construction is primarily a high voltage design.

The Bus is carried in insulating tubing which is clamped by insulating supports. The centre contacts are rigidly held by the bus, leaving no short clearances between live metal and the studs which are mounted in the iron case.

The box and gasket are tested with full city water pressure of twenty four pounds, the insulators are flashed over at 80,000 volts or above, the completed box is tested at 40,000 volts.

Potheads and Boxes for any Service - - - for all voltages up to 15,000.

G & W ELECTRIC SPECIALTY CO.
7440-52 So. Chicago Ave CHICAGO, U.S.A.

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A. H. Winter-Joyner, Ltd., 10 Cathcart Street Montreal.
Bentz-Richardson Co., Ltd., 592 Notre Dame Ave., Winnipeg.
General Supplies, Limited, Calgary and Edmonton.



Electrical

News

Engineering
Contracting

Merchandising
Transportation

STANDARD UNDERGROUND CABLE CO. OF CANADA, LIMITED

General Offices and Works: Hamilton, Ont.

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Colonial Copper Clad Steel Wire
Weatherproof and Magnet Wire
Rubber Insulated Wires
Varnished Cambric Insulated Cables
Paper Insulated, Lead Covered Cables
Fibre Insulated, Lead Covered Cables
Rubber Insulated, Lead Covered Cables
Steel Wire and Steel Tape Armored Cables
Outdoor and Indoor Cable Terminals
Cable Junction Boxes
"Ozite" Insulating Compounds,
etc.

For complete information, prices or estimates, write our nearest branch office.

MONTREAL

TORONTO

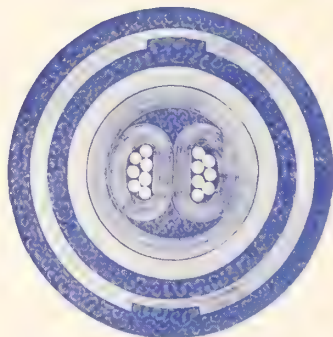
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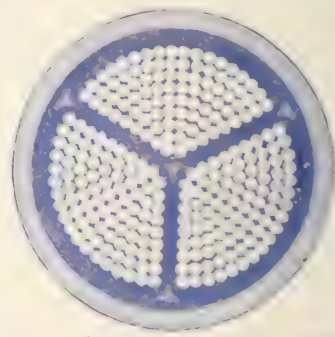
SEATTLE



The Torch Relay
An Ancient method of
Grecian communication



Cross Section of a two-conductor No. 6 B & S. paper insulated, lead covered and double steel tape armored cable for a working pressure of 6000 Volts. This type of Cable is eminently suitable for installations where the cable is laid in the ground without cable ducts. The steel tape armoring affords ample protection to the lead sheath.



Cross Section of a three sector conductor 750,000 circular mil paper insulated, lead covered cable for a working pressure of 600 Volts. Note the shape of the sector conductors. The well rounded corners are so designed to prevent dangerous electrical stresses between each conductor and either of the other conductors or the lead sheath.

Largest Canadian Manufacturers of Bare and Insulated Wires and Cables

Northern Electric Company
LIMITED

Montreal
Halifax

Quebec
Ottawa

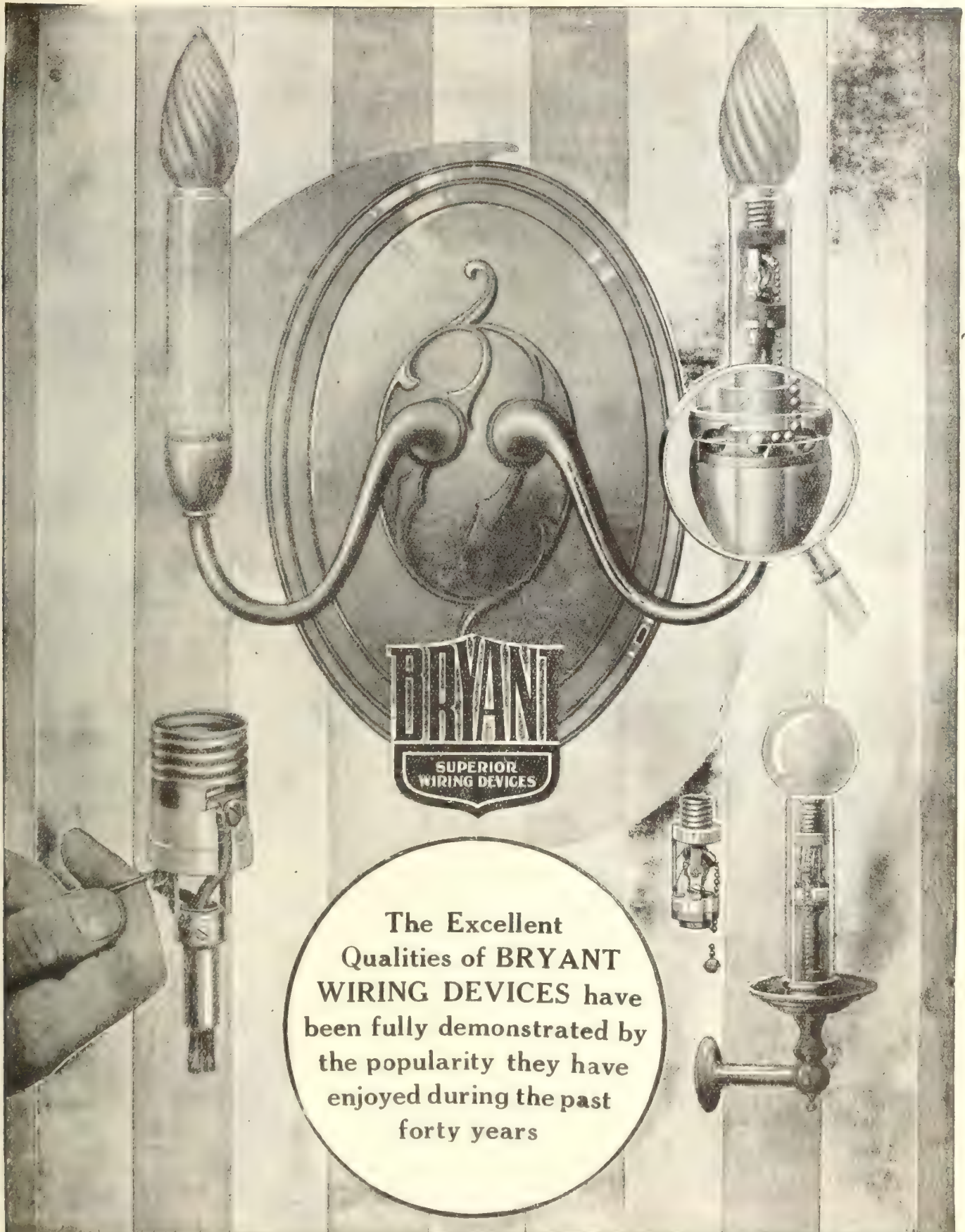
Toronto
Hamilton

London

Windsor
Winnipeg

Regina
Calgary

Edmonton
Vancouver



The advertisement features a central logo for "BRYANT" in a stylized font, with "SUPERIOR WIRING DEVICES" written below it in a shield-like shape. The background is a vertical wood-grain pattern. Various electrical components are illustrated: a large ornate wall sconce with two curved arms holding incandescent bulbs; a circular inset showing a detailed view of a bulb's internal filament; a hand using a screwdriver to install a screw into a wall plate; a small cylindrical device with a screw; and a vertical rod with a spherical cap and a base. A circular text box in the lower center contains the following text:

The Excellent
Qualities of BRYANT
WIRING DEVICES have
been fully demonstrated by
the popularity they have
enjoyed during the past
forty years

Northern Electric Company
LIMITED

Montreal Halifax Quebec Toronto Winnipeg Calgary Vancouver
Ottawa Hamilton London Windsor Regina Edmonton

Good Business



MISS SIMPLICITY and good business go hand in hand. Miss Simplicity makes such a winning appeal that it is very easy to sell. In handling Miss Simplicity, our dealers find that business is always good.

An electric washer like Miss Simplicity is not a luxury but a necessity in the home. Saves the housewife's health and strength, saves laundry bills and wear and tear on clothes. Every home wired for electricity is a prospective purchaser of a Miss Simplicity Electric Washer.

Miss Simplicity pleases by its substantial construction, simple design and efficient operation. The price, too, quality considered, is low. But Miss Simplicity is not only a sales maker, it is a builder of goodwill and good business, too. Miss Simplicity in a home will work for you while working for your customer, making many more prospects among the friends of the family.

Increase your profits with Miss Simplicity. Write for our dealer proposition and full particulars of the handsome profit and liberal guarantee given with every machine. Send for a sample machine and put it on display.

We are prepared to help our dealers in advertising Miss Simplicity. With our dealer offer, we will send you a folder giving full particulars of this. We also guarantee prompt shipment and efficient service.

"Takes out the Drudgery with the Dirt"



W. A. KRIBS COMPANY, Limited Hespeler, Ontario

Quebec Distributors
Northern Electric Company
Limited
MONTREAL. P.O.

Western Distributors
Great West Electric Company
Limited
WINNIPEG. MAN.

O-B High Tension X Strain Insulators



O-B XH Insulator—Patented

An exceptionally rugged and compact strain insulator. Round corners shed abuse. Rated at 2500 Volts. $3\frac{3}{4}$ inches diameter. Particularly favored for trolley cross spans.



O-B X Insulator—Patented

One of a series rated from 1500 to 6600 Volts. Ranges from $3\frac{1}{2}$ to $5\frac{3}{4}$ inches diameter.

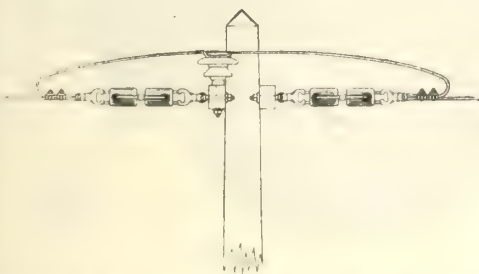
Buy Insulators for guy wires and dead ends as shrewdly as you do regular line insulators

"When I pick insulators," says the Engineer. "I look beyond price for performance. On the reliability of the individual insulator depends the reliability of the line. Quality is all important."

The same sound reasoning applies to strain insulators. In the O-B Type X Family is a wide range of rugged insulators which carry mechanical loads easily and electrical stress safely.

They are made of high tension (wet ware) porcelain side by side with the same insulators which are used on the highest commercial voltages and which have been chosen by the bulk of the electrical industry for every duty.

O-B X Strains have been especially successful in the exacting wireless service on land and at sea.



O-B X or XH Insulators in series are often an excellent solution of dead end design. O-B Patents simplify the job.

*Quantity production keeps the price low.
Deliveries Prompt.*

The Ohio Brass Co., Mansfield, Ohio

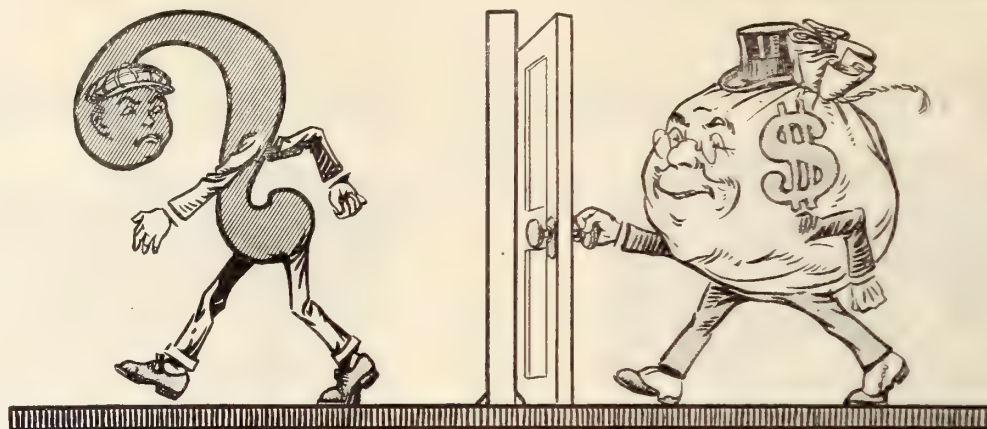
New York
Chicago

Philadelphia
Los Angeles
Paris, France

Pittsburgh
San Francisco



Manufacturers: Trolley Materials; Rail Bonds;
High Tension Porcelain Insulators;
Third Rail Insulators;
Electric Railway Car Equipment.



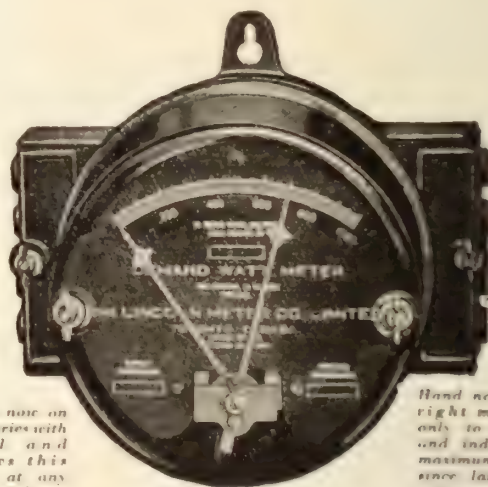
Where Money Enters, Guess-work Should Leave!

Billing for electric service, just as billing for anything else, should be done in a business-like manner. There should be no chance for anyone to doubt the accuracy of the amount of money asked for in any bill.

Every item that enters into the bills you render should be *measured*. A customer's demand should not be estimated any more than his kw. hour consumption. In fact, 85% of your cost of furnishing electric service is due to your fixed charges (if a Hydro-Electric plant). Only 15% is due to the actual amount of energy consumed. It is only when you measure a customer's demand can you be certain that you are distributing equitably your fixed charges. Only then can you be certain that the "85% portion" of your bills are correct.

A Lincoln Demand Meter enables you to measure demand just as accurately as you now measure kw. hour consumption. Its thermal principle has been proved by many of the Dominion's leading central stations. In *every* instance, one or two trial meters have been followed by rapid installations on the lines of other customers.

You are invited to investigate what the Lincoln Demand Meter can do for you from both a financial and a goodwill standpoint. Write us to-day for a complete description of the meter and its use.



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last re-setting.

Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374

Lincoln
MAXIMUM DEMAND
meter

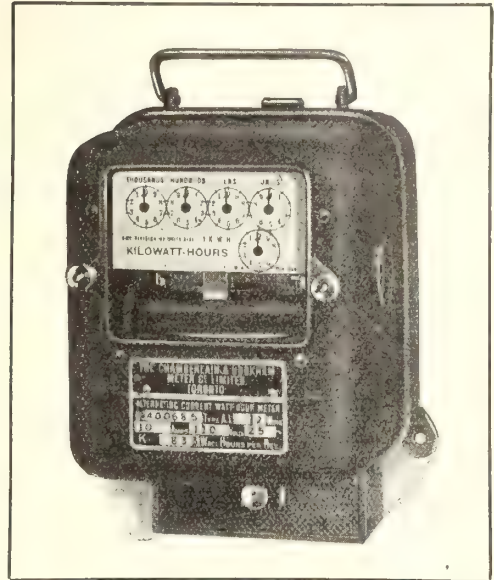


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World

To Our Patrons In the Province of Ontario

We are pleased to inform you that we have opened an office and show room at 105 Victoria Street, (Room 116) Toronto, under the management of Mr. W. R. S. Careless, who will be pleased to receive a visit from you at any time and will show you material of our latest manufacture.

Trusting you will favor us with a continuation of your valuable patronage and that you will find this office a convenience, we remain,

Yours very truly,

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame St. West

Montreal, Que.

Ajax Plural Socket Plugs

(Patent applied for)

THE PLUG OF A THOUSAND USES

In a Class by Itself—Made for a Purpose—It Fills Requirements

Packed in Individual
Cartons
Ten
In Display Carton



Three Color Combination
Easel and Hanger as Illustrat-
ed Furnished Free With Each
Display Carton



Canadian Prices
No. 22 — Double
Retail
Now \$1.25 Each
Three for \$3.50

Canadian Prices
No. 33. — Triple
Retail
Now \$1.50 Each
Three for \$4.25



Same Discounts Still Apply

Leaves Lamp In Position Intended.

The Only Plural Socket Plug Made Right For One Lamp And Appliances.
Other Plural Socket Plugs with both socket shells at an angle were in-
tended for two carbon lamps, before appliances were in general use.

Do you want a plug to fit conditions as they were seventeen years ago, or
as they are today?

Would you buy a 1904 Model Automobile in 1921?

Ajax Plural Socket Plugs Are 1921 Models

Made Right - Priced Right - Advertised Right

Are You Getting Your Share of This Demand?

Dealers—Order from your Jobber!

Jobbers—Get Our Proposition!

Ajax Electric Specialty Co.
1011 Market Street, St. Louis, Missouri



*The Famous Super Electric
Model of the ABC Electric
Laundress*



*Some Washers
lift and dip*



*Other Washers
rock and toss*

*This ABC Electric
Laundress does both*



It Combines the Advantages of all other Washers

Not only does this "Super Electric" model of the A B C Electric Laundress line sell easily because it washes rapidly, thoroughly and gently by combining the two leading methods of washing—the lifting and dipping of cylinder and vacuum cup washers with the rocking and tossing of oscillating washers.

Also it is easy to sell because it runs so quietly, so smoothly. There is no continual crash of parts. There is no lurching about—a pencil will stand on end upon the tub, so free is this washer from vibration. Obviously these things mean a longer life and less service trouble.

An exclusive springless mechanism accomplishes all this. Equally simple and sturdy in every part, the entire washer is

capable of uninterrupted service to its users. For it is mechanically perfect, the result of its years on the market.

Whether equipped with a copper or galvanized tub, a maple or zinc cylinder, this A B C knows no equal. It is the finest washer produced. It is for those who desire the best. Yet it retails at a price in line with competitive washers which offer less. And the profit for the dealer is liberal.

Excellent distributing arrangements throughout the Dominion on the entire A B C line—which also includes the A B C "Alco" (dolly-type) washers and the A B C Electric Ironer—add further to its attractiveness from the dealer's standpoint.

Write for the A B C sales co-operation proposition to dealers; it's a money-maker

A B C Electric Laundress

ALTORFER BROS. COMPANY, Pioneer Makers of Power Washers and Ironers
PEORIA, ILLINOIS, U. S. A.

C. D. HENDERSON, Canadian Representative, Box 123, BRANTFORD, ONT.

WHOLESALE DISTRIBUTORS

ONTARIO

MARITIME PROVINCES
Blackadar & Stevens, Roy Building, Halifax,
N. S.

The Central Electric Supply Co., Ltd., 36
Adelaide St. West, Toronto.

ALBERTA
Cunningham Electric Co., Ltd., Calgary.

QUEBEC
Dawson & Co., Ltd., 148 McGill St.,
Montreal.

SASKATCHEWAN
Sun Electrical Supply, Ltd., Regina.

BRITISH COLUMBIA
Rankin & Cherrill, Vancouver

Monarch Porcelain Wiring Devices



Monarch No. 247 Key Wall Socket

MONARCH Porcelain Wiring Devices are all made of first grade porcelain and metal parts.

Their strong and well tried design will give you the most reliable service. The skilled and painstaking labor used in their assembly further protect both seller and user. We shall be glad to explain to you the detailed make-up of any of these devices.

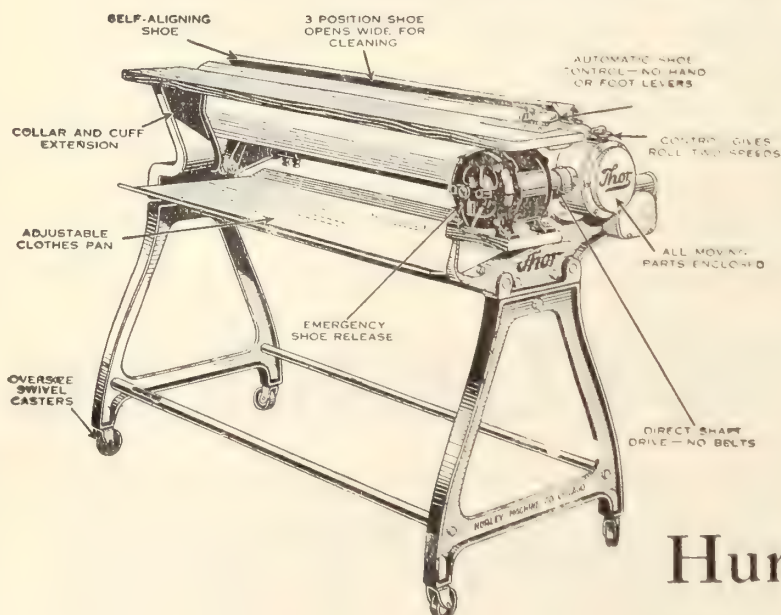
You can get prompt delivery on Monarch Porcelain Material on account of the good stocks maintained.

You will be interested by our prices on these devices. Let us quote you.

SELL MONARCH CANADIAN-MADE MATERIAL

Monarch Electric Company, Ltd.
St. Lambert District of Montreal

The New *Thor* 75 Automatic Electric Ironer



The finest labor-saving appliance ever offered to the housewife. Notice the features—it is a real home ironer, an ironer every woman wants.

Hurley Machine Co.,
Limited
Ryrie Bldg. Toronto

Galvaduct



A Galvaduct Building

New Plant—Canada Decaleconomia Co. Ltd., Toronto, Ont.

“GALVADUCT”

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

“LORICATED”

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Loricated

Always Specify GALVADUCT or LORICATED CONDUITS

If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

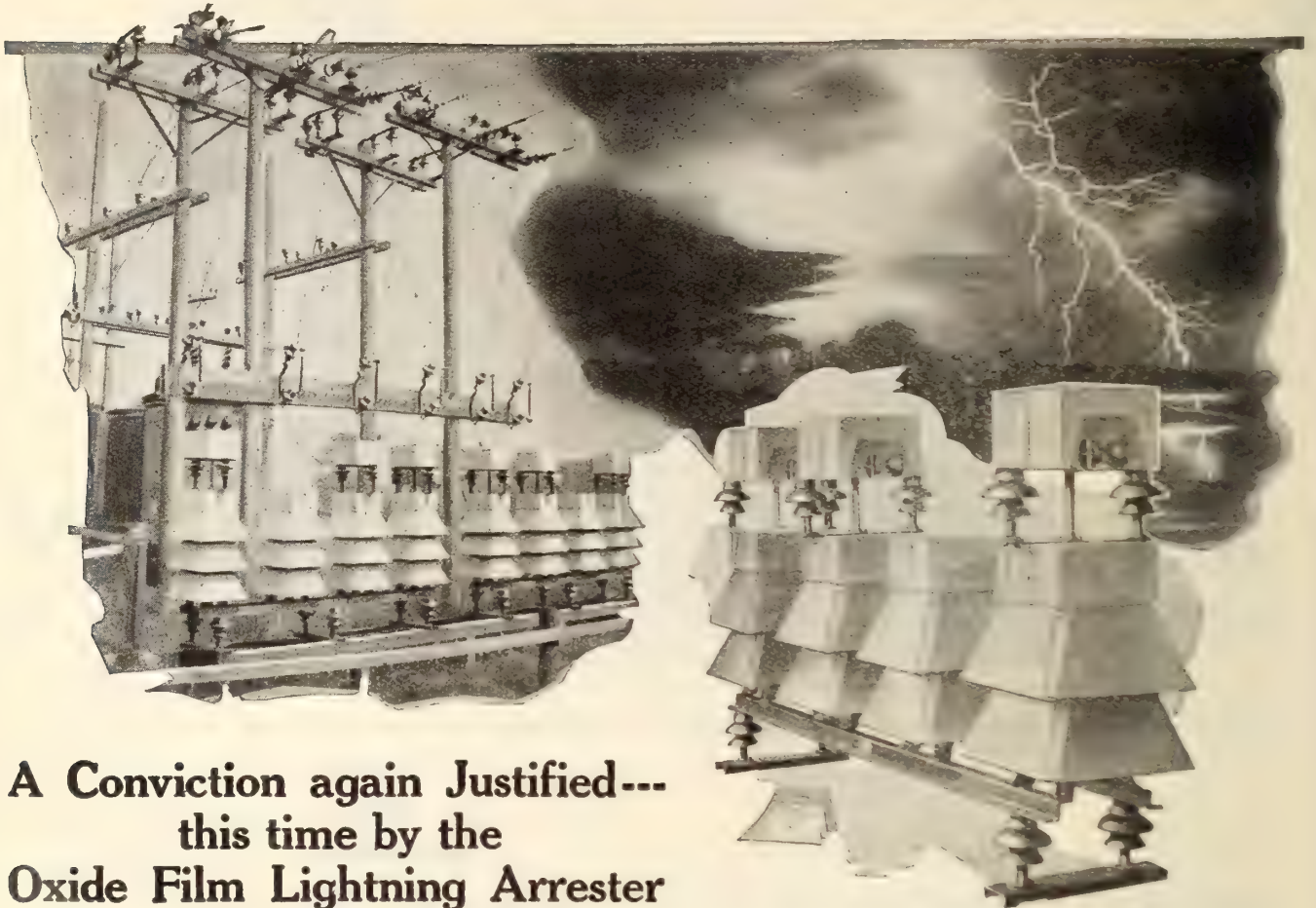
TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

"Whatever difficulties in future electrical engineering develop from electricity of the atmosphere, it is my conviction that our resources will be extended to meet them"

Elihu Thomson, 1902



A Conviction again Justified--- this time by the Oxide Film Lightning Arrester

THE Oxide Film Lightning Arrester meets the long felt need for an arrester of the highest protective qualities but comparable in operation, maintenance and general construction with other electrical apparatus.

Six years of successful operating experience have demonstrated that the arrester will give protection against lightning and that the design is suitable for the severe requirements of modern engineering practice.

Hundreds of oxide film lightning arresters are now giving protection under all sorts of operating conditions.

Complete information will be sent you on request.

Canadian General Electric Co., Limited

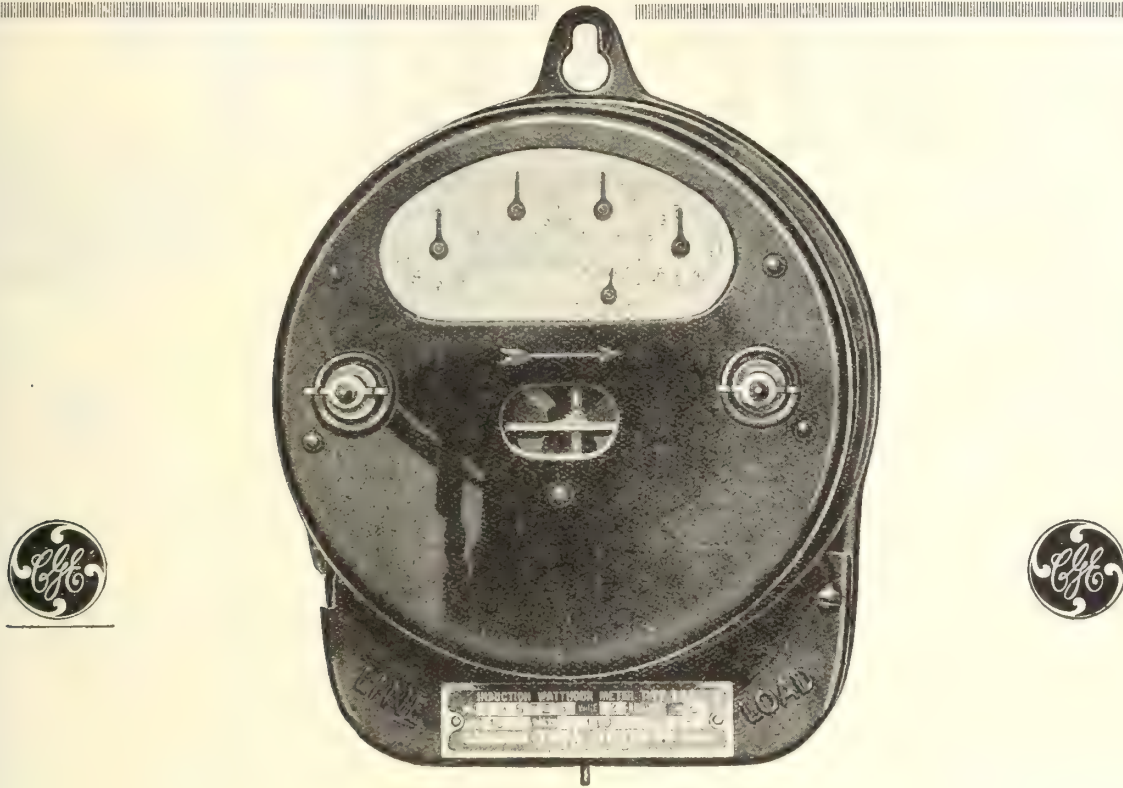
Head Office



TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson, and Victoria.

The necessity of a true record of distributed energy demands dependable Watthour Meters



C-G-E Watthour Meters

When you install C.G.E. Watthour Meters you have at your service the result of years of Meter manufacturing.

Our Engineers are continually conducting exhaustive tests, and everything that can be done to ensure accuracy, reliability and durability is incorporated in the C.G.E. single-phase Watthour Meter, Type I-14.

The maintenance and testing expense of the I-14 is exceptionally low. Accessibility is another important feature. Only the cover need be removed for full or light load adjustment, inspection of the register and disk magnets.

The result is a meter worthy to be included among C. G. E. Electrical Goods.

Write our nearest Sales Branch for full particulars

Canadian General Electric Co., Limited

Head Office, TORONTO

Branch Offices: Montreal, Quebec, Sherbrooke, Halifax, Sydney, St. John, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Nelson, Vancouver and Victoria

"TRICABLE"

Indestructible Armored Conductors
For Better Concealed Wiring
Sold by the Better Class of Jobbers

GENERAL SALES AGENTS

CONDUITS COMPANY LIMITED

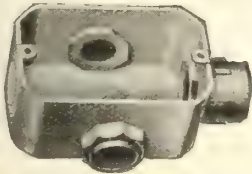
33 Labatt Avenue

Toronto

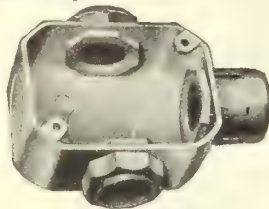
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body

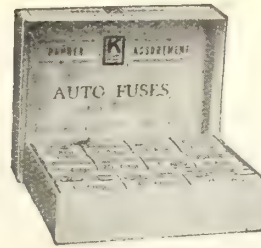


Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

Used
From

Universally
Approved

Moloney
*A purely
Canadian made
Product.*



Transformers

*All inquiries
receive prompt
attention.*

Coast
to
Coast

Reliable
and
Efficient

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.

District Offices

Factory

Head Sales Office

Montreal and Halifax Windsor, Ont. 1221-2 Bank of Hamilton Bldg. Toronto



**Staunch!
Sturdy!
True!**

Here is a stunt that has been tried more than once on the element of a

Sangamo D-5^Watthour Meter

It proves better than any other ready means that jarring does not injure the moving element of the meter that is built like a watch. It

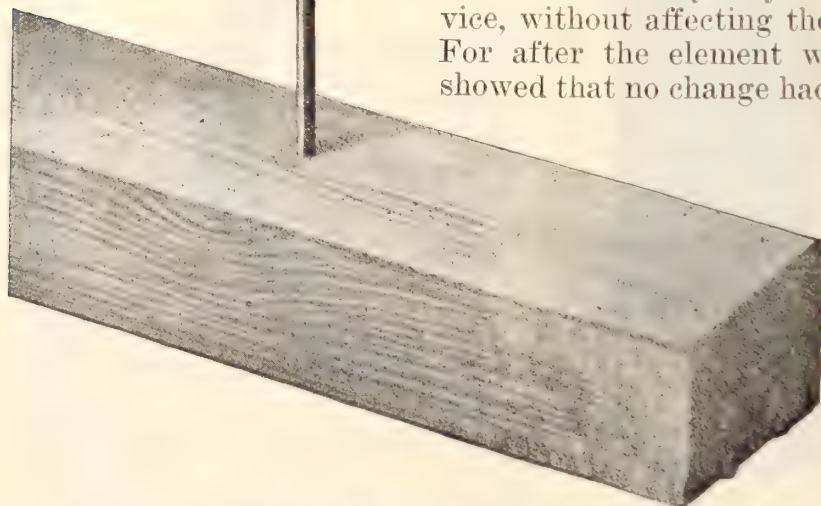
proves that Sangamo D-5 Meters will ably withstand any mechanical shock or vibration to which they may be subjected in service, without affecting their high accuracy.

For after the element was placed back in the meter, tests showed that no change had occurred in the calibration—truly a demonstration of sustained accuracy.

The moving element of Sangamo D-5 Meter floats on mercury—no jewelled bearings to chip and pulverize. The more you learn about Sangamo Meters, the more firmly you will be convinced that they are the meters of sustained accuracy.

Let us send Bulletin 5318

Driving a nail into a 2" x 4" Spruce block with a Sangamo D-5 Meter element.



Sangamo Electric Company
of Canada, Limited

Factory: TORONTO

Head Sales Office: MONTREAL

ADVANCE NOTICE

On or about August 1st we will issue a complete catalogue showing electric Fixtures and Glassware, also a supply catalogue. The Fixtures will be an exclusive line of our own of the best sellers and finish. The Glassware will be Canadian, American and European. The advantages of these catalogues will be that everything shown we will have in stock for immediate delivery. Fill in the blank below, and we will be pleased to forward you a catalogue.

FRANKE, LEVASSEUR & CO., LIMITED

150 CRAIG ST., W.
MONTREAL.

NAME _____

ADDRESS _____

BUSINESS _____

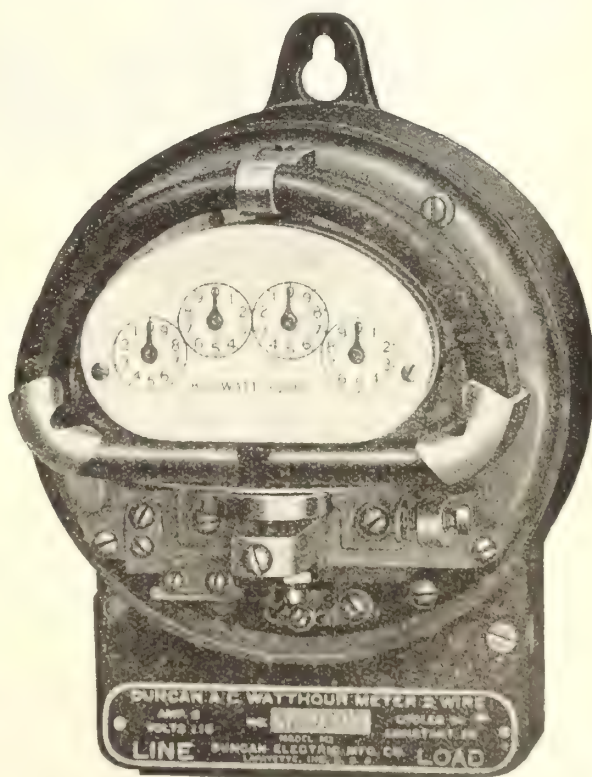
DUNCAN MODEL M2

FOR ALTERNATING CURRENT SERVICE

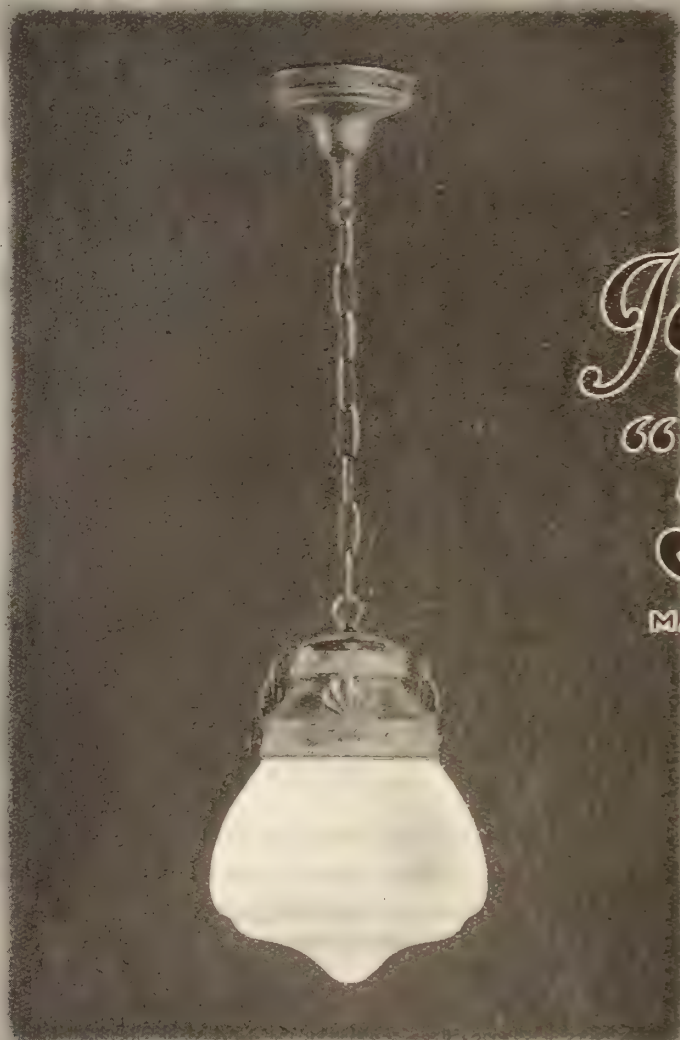
SUPERIORITY

of construction has always been looked upon by Duncan engineers as one of the prime requisites in meter development, and this ideal is characteristically manifested in the Model M2. Its every detail towards perfection has been worked out to a degree of precision hitherto unobserved.

No other meter in use today shows the degree of accuracy on overloads as does the Duncan Model M2. Test this out for yourself. Its magnet is so satisfactory and dependable that it is looked upon as opening up a new era of design for permanency.



THE GEORGE C. ROUGH SALES CORP'N. 134 CORSTINE BLD'G
MONTREAL



Jefferson

“515”

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A Pleasing Deviation From the Ball Globe

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo glass, with standard 6" fitter. Adaptable for any business lighting.

GET ON THE “515” AND CREATE NEW BUSINESS

*Ask for Our New Booklet of Commercial
Lighting Units*

The Jefferson Glass Company, Limited

Head Office and Factory: 388 Carlaw Avenue
Toronto

Showrooms: 164 Bay St., Toronto
272 Main St., Winnipeg

285 Beaver Hall Hill, Montreal
510 Hastings St. W., Vancouver



COLUMBIA PYRAMID BRUSHES FOR STREET CAR MOTORS

Uniform
in Structure
Uniform
in Capacity
Uniform
in Size
Uniform
in Performance

There is one best type of Columbia Pyramid Brush for your motors. Let us put on exactly the brush you need.

CANADIAN NATIONAL CARBON CO.
LIMITED

Toronto and Winnipeg

1520



Strong and Silent Gears

It is a fact that in most cases the silent gear has been achieved at the cost of efficiency in service! They can not stand the wear and tear and are soon out of commission.

CONDENSITE CELORON

A waterproof Fibre for general manufacturing purposes has done away with this difficulty. Gears made from Condensite Celoron are in universal demand not only because they are *noiseless*, but because of their *unusual wearing qualities*. Their installation in a gear-drive will combine the efficiency and regularity of an all-metal gear-drive with the silent, smooth operation of a belt transmission. Not only is the life of an expensive cut-gear almost trebled when meshed with a Diamond Fibre pinion, but the slight elasticity of the fibre absorbs shocks and eliminates vibration, thus prolonging the life of the bearings.

Send for fuller particulars about this wonderful Fibre or have our representative call and tell you all about it, and its uses.

Washers, Pulleys, Bushings, Frictions, Insulating Papers, Slot Wedges, Handles, Parts for starting, lighting and ignition systems, Sheets, Rods and Tubes.

Diamond State Fibre Company
of Canada, Limited.

Head Office and Works
235 Carlaw Avenue,
TORONTO, CAN.



"When Dreams Come True"

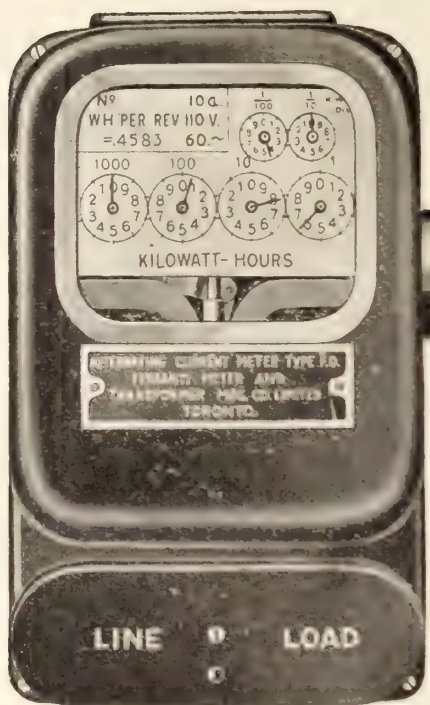
Introducing—THE KID

The Last Word in Meters!

Small, but equal to the job.

Special Features

Light weight, only 4 lbs.
 Portable
 Compact
 Pressed Steel Case and Cover
 All parts easily removed
 Accessibility



SCALE $\frac{1}{2}$ SIZE

Special Features

Cam Type Self-locking
 Adjustments with Graduated
 Scales for Light Load,
 Full Load and Inductive Load

No Unnecessary Screws

Very easily and quickly
 Calibrated

Wall Fixing Wood Screw
 provided as part of Meter

Type F. D. Integrating Watthour Meter.

Shipments from Toronto Stock. The most up to date meter on the market.

Ferranti Meter & Transformer Mfg. Co. Ltd.

20 Noble St.
 TORONTO

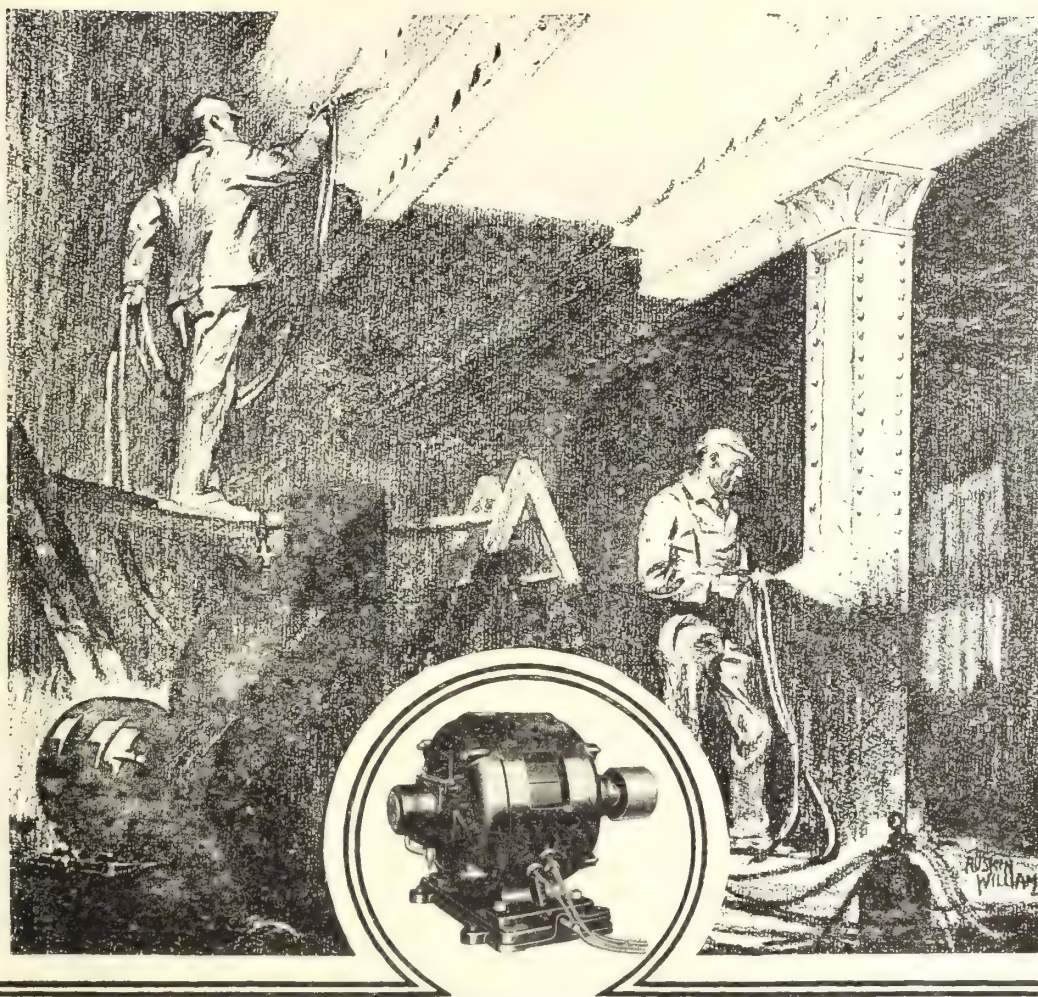
128 Bleury St.
 MONTREAL.

Simpson Bldg
 HALIFAX.

145 Market Ave.
 WINNIPEG

Northwestern Engin-
 eering & Supply Co.
 CALGARY

Northern Ontario
 J. P. Bartleman
 Timmins



ONE of the best evidences of R & M Motor reliability is their general use by manufacturers of quality machines of all classes who sell their product with the motor attached or built in as part of the equipment. Hundreds of leading manufacturers of motor-driven devices from household devices to machine tools, have standardized on the R & M motor as insurance that the power end of their product will be in keeping with the quality of their manufacture. That such manufacturers, once they have tried the R & M motor, rarely change to another, is a reflection of the service satisfaction users invariably obtain from the R & M equipped machine.

THE ROBBINS & MYERS COMPANY
OF CANADA, LIMITED

BRANTFORD, ONTARIO

Robbins & Myers Motors

CUTLER - HAMMER

Automatic Starter

Theatre Dimmer

Magnetic Clutch

Magnetic Separator

Lifting Magnet

Compensator

Drum Controller

Motor Operated Brake

Magnet and Control Devices

¶ Cutler-Hammer Lifting Magnets and Magnetic Separators have proved of exceptional value in the mining field, in steel mills and in many other industries for lifting and separating metals. The Magnetic Clutch and electrically operated Brake, used primarily in steel and rubber mills and for crane control respectively, are widely applicable to many industries where the gradual engagement or adequate braking of a load is desirable.

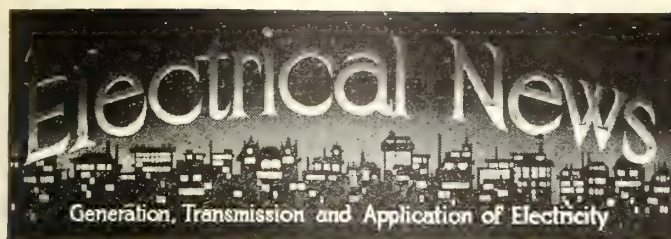
¶ In electric controlling devices of all kinds Cutler-Hammer is the recognized standard of dependability, whether for fine speed adjustment of a machine, extremely close voltage regulation, the wonderful light dimming and colour effects in a modern theatre, or the automatic control of heavy loads or other special operations.

¶ Details and recommendations of suitable Cutler-Hammer apparatus for your control problems are available at our branches.

Northern Electric Company

LIMITED

Montreal	Quebec	Toronto	London	Regina	Edmonton
Halifax	Ottawa	Hamilton	Windsor	Winnipeg	Vancouver



For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

HUGH C. MACLEAN PUBLICATIONS LIMITED

THOMAS S. YOUNG, Toronto, Managing Director

W. R. CARR, Ph.D., Toronto, Managing Editor

HEAD OFFICE - 347 Adelaide Street West, TORONTO
Telephone A. 2700



MONTREAL - - 119 Board of Trade Bldg.
WINNIPEG - - - Electric Ry. Chambers
VANCOUVER - - - - Winch Building
NEW YORK - - - - - 296 Broadway
CHICAGO - - - Room 803, 63 E. Adams St.
LONDON, ENG. - - 16 Regent Street S. W.

ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for \$2.00 per annum. United States and foreign, \$2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean Publications Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, July 15, 1921

No. 14

Is it not Time our Two Central Station Associations Cease Duplication of Effort?

These are times when we hear much about the necessity for efficiency; the need to prevent waste by overlapping; the stupidity of duplication of effort; the urgent need for co-operation in the electrical industry, so that we, as an industry, may go forward and fulfill to the highest limit the functions that it appears to be our set duty and privilege to perform.

During the month of June two very enjoyable, very educative, and withal, very successful conventions of electrical men were held in Canada. In each case the reports, papers and discussions were devoted to subjects of special interest and value to men dealing in the manufacture and supply of electrical energy and the various appliances for which electrical energy is used. In a word, the problems discussed at the two conventions were practically identical; efforts being put forth to solve them were along practically the same lines, and it follows, therefore, that at many points there is a wasteful duplication of effort.

There is no business in the world where the meaning of the word "duplication" is better understood than it is among electrical men. The man on the street sees, in an intangible sort of way, that duplicate transmission lines—one owned by a municipality, perhaps, and one by a private company—are not essential, but he probably never realizes, as the operating companies themselves do, the tremendous financial loss and, in many cases, the utter lack of need of that duplication. They should be the first, therefore, to realize that the duplication of

effort of two such organizations as the Canadian Electrical Association and the Association of Municipal Electrical Utilities is unwise and very wasteful of effort.

In suggesting that it is time that these two organizations get together for the discussion of common problems, we do not overlook the difficulties that plainly stand in the way of such a course. To begin with, there is the sentiment of the thing: the lack of cordial relationship that has existed in the past—not so much at the moment, we believe—between privately owned and municipally owned central station managements. In addition to this there is the connection between the Canadian Electrical Association and the National Electric Light Association, which, of course, it would be necessary to sever. Third, there is the fact, evident to all, that there are certain private matters that neither the private companies nor the municipalities would care to discuss other than in camera.

The question is, do these objections constitute a sufficient obstacle to the union of the two organizations?

Judging from remarks that have recently been made by members of both organizations, it would appear that there is a general feeling towards the formation of one big Canadian electrical association. Central station men, operating engineers, manufacturers and jobbers probably have not thought farther than an association along lines similar to the C.E.A. or the A.M.E.U. There seems no reason, however, why contractors, dealers and consulting engineers should not be brought in.

Why not one great big powerful association of Canadian electrical interests, with as many sections as you like? For example, there could be a section devoted to pure engineering, a section devoted to merchandising, a section devoted to contracting, to manufacturing, to jobbing, to the policy of private companies, the policy of municipalities, an operating section, etc. Such an association would cover the whole of Canada, and, presumably, should be worked out first on a provincial basis; afterwards the provinces might appoint representatives to a Dominion executive, and, perhaps, once a year meet in convention. What a splendid effect it would have on the public in general if two or three thousand enthusiastic electrical men, gathered from coast to coast and representing their part of the electrical industry in every province of Canada, met annually at a central point! What an effective committee could be formed by picked representatives of the various sections of the industry from every province, meeting to transact business affecting the common weal! We have talked much of co-operation and organization, but so far we have nothing but the merest patchwork, with a tremendous duplication of effort.

Winnipeg Board of Trade Secretary Addresses Manitoba Electrical Association

In an address delivered by W. E. Milner before the Manitoba Electrical Association on Thursday, June 9th, he outlined a plan for the re-establishment of the Winnipeg Exposition, prefacing his remarks by the statement that anything he would say in no way binds the Board of Trade the organization with which he is connected, because that body has not as yet decided upon any definite plan.

The Exhibition should be established along lines commensurate with a city as progressive and large as Winnipeg, and we should endeavor to make it one of the best fairs on the North American continent. His proposition was as follows:—

That the City Council should submit a by-law to the people asking for the issuing of debentures amounting to \$1,000,000 spread over twenty years, which would require an annual payment of \$84,000 a year to extinguish the debt at

the end of the period. This would mean on the present assessed value of the city of Winnipeg, which amounts to \$240,000,000, an increase in the rate of 7/20ths of a mill, which works out as follows:—

Every person assessed for \$1,000 would be required to pay 35c a year in each of the twenty years. If assessed for \$10,000 he would be required to pay \$3.50; if assessed for \$100,000 he would be required to pay \$35 a year. After having secured the money, Mr. Milner proceeded to map out how it should be expended.

\$50,000 should be spent on the erection of a first class grand stand; \$5,000 on improvements to the track; \$10,000 for drainage; \$10,000 on improved fencing; \$15,000 for first class executive offices; \$200,000 on General Exhibition Building, this building to be carried three stories high and would be the main building; \$175,000 on Manufacturers' and Electrical Building; \$175,000 on Auto and Vehicle Building; \$150,000 on a first class stock arena; \$50,000 on cattle and horse barns; \$25,000 on poultry houses; \$25,000 on auto parking road; \$25,000 on walks.

The balance of \$85,000 should be spent on general landscaping and improvements to the grounds so as to make it a first class park for the use of citizens for that portion of the year when it is not used for exhibition purposes. Consideration should be given to a first class race track and athletic ground.

We must then consider how the Exhibition is going to be managed. In order to do this I would form a joint stock company known as the Winnipeg Exhibition Operating Company, with a capital of \$100,000, selling 1,000 shares at \$100 each, and this should be subscribed by the business men of the city. The directorate should be elected in fair proportion from this company, the Provincial Government and the City Council. We would then be able to conduct affairs in a modern way.

Some provision might be made for the return of some of the money to the City Treasury in order to meet the yearly obligations. There should be very liberal assistance given by the Provincial and Federal Governments, which should amount to at least \$20,000 a year.

Fairs have been successfully conducted in Western Canada, also in Eastern Canada and portions of the United States. From the most reliable statistics the attendance at all the Western fairs, Regina, Saskatoon, Edmonton, Calgary and Brandon, has increased 100 per cent during the last seven years as between 1913 and 1920. The same applies to fairs in the States of Minnesota and Indiana as well as to the great fair held in the City of Toronto, and there is no reason why the same success should not attend an exhibition in the City of Winnipeg.

You may ask what great benefit an exhibition is to a city. We have at the present time in the city of Winnipeg and surrounding districts 50,000 children attending the public schools, and they have had no opportunity for six years of seeing any of the progress that has been made in stock raising, industries and electrical inventions, etc.

From an advertising standpoint there is nothing that would equal the advantages that this fair has to offer in advertising the province of Manitoba and the city of Winnipeg. From a business standpoint, if we had an influx of 150,000 people attending this exhibition, the average expenditure would amount to \$30 or \$40 per day, or a total expenditure of \$6,000,000. Based on a net profit of 15 per cent would mean that \$900,000 would be distributed among the business interests of the city.

If there is anything that the business men of the city of Winnipeg are lacking in it is the want of acquaintance with our agricultural communities, and this would be a means of placing us in closer touch with our agricultural population.

The Radio Research Club of Canada

A number of gentlemen interested in "Radio" met together last March and organized a new club, to be known as the Radio Research Club of Canada, with headquarters in Toronto. This club promises to be a very useful organization, and no doubt will be of great assistance to both present and future members. The general aims of the club are:

(a) To bring together for mutual pleasure and benefit, engineers, students and manufacturers of radio apparatus, who are interested in high frequency phenomenon, especially in its application to radio communication.

(b) That the members may be the better able to co-operate in radio research.

Meetings are held every third Thursday throughout the autumn, winter and spring, but are suspended during the summer months. Professor Rosebrugh has kindly offered the club the use of a room in the new Electrical Building of the University of Toronto, in which to hold these meetings. So far the following have been held:

April 7—Lecture by Professor Rosebrugh on "Alternating Currents, with Special Reference to High Frequency Phenomenon."

April 28—Second lecture on the above subject.

May 19—Third lecture of this series. Election of officers.

June 9—Fourth lecture, with special reference to "Filters." Exhibition of and discussion on "Values of Various Types," by Dr. C. A. Culver and Mr. W. C. C. Duncan.

All further meetings are now suspended until Sept. 22nd.

The following are the officers of the club: Honorary President, Prof. T. R. Rosebrugh; President, C. A. Culver, Ph. D.; Secretary-Treasurer, F. K. Dalton. Executive Committee—W. C. C. Duncan, J. E. Genet, E. J. Bowers.

This club is desirous of including in its membership all of those whose work or interest brings them in touch with the problems of radio communication. Application for membership may be submitted in writing to the Board of Directors, through the secretary, and must bear the written endorsement of at least three members of the club in good standing. Applicants should state their present occupation and the extent of their experience in radio work.

The address of the secretary is, Hydro-Electric Laboratories, Strachan Avenue, Toronto.

What Membership in an Electrical Association Should Mean

At the last fortnightly luncheon held by the Manitoba Electrical Association, Mr. Chas. F. Roland, general secretary Employers' Association of Manitoba, outlined to the members "What membership in the Electrical Association would mean." The following outline of principal benefits to be derived were mentioned:—

It means that you will get a special service not performed by any other organization.

It means that you will secure the co-operation and help of all interested in the trade.

It means association with men directing the largest electrical businesses.

It means unity in place of individual effort.

It means that the individual will benefit from the combined prestige, wisdom and influence of our large membership.

It means that legislation affecting your interest will be looked after when needed.

It means success in place of failure in efforts to co-operate and maintain a healthy relationship between employers and employees.

It means paving the way at all times for better conditions and better business, which is essential in the public interest.

Mid-summer Convention of Association of Municipal Electrical Utilities

**Niagara Falls the Centre of Attraction for "Hydro" Engineers.
Chippawa Project approaching Initial Stages of Completion.
Valuable Papers and Discussions sandwiched with Lots of Fun.**

The midsummer convention of the electrical engineers, superintendents and managers connected with the various Hydro municipalities of the Province of Ontario is always looked forward to with pleasure, not only because this convention is more or less in the nature of a reunion of old friends, but also because it is held each year at Niagara Falls, which must be acknowledged as the most attractive convention city in the Province at this time of the year. That the members appreciate the advantages to be gained by attendance at this convention is shown by the large number that turned out—this year about 300.

It has always been noticeable that the program of this convention is less crowded than the average, which has left a reasonable amount of time for discussion and general conversation. It is possible that the Program Committee this year erred somewhat in an endeavor to crowd too many topics into three sessions. A brief resume of the proceedings is given below:

Thursday Afternoon.

The first session was held on Thursday afternoon and consisted of a brief address by the president, a number of reports, and certain minor revisions of the constitution and by-laws. Following routine business, addresses were given on "Advertising" by Mr. L. J. Cuniff of the H. K. McKann Company, and on "Sales Campaigns," by E. H. Porte, general manager Renfrew Electric Products, Renfrew. Papers were presented by Mr. A. S. Edgar, manager of the Supply Department, Canadian General Electric Co., Ltd., and Mr. G. W. Blay, manager Appliance Department, London Public Utilities Commission, the former on "Window Dressing" and the latter on "Service in Merchandising."

The regular convention dinner was held at 6.30 Thursday evening. Mr. M. J. McHenry, president, was in the chair, and, following the toast to the King, brief oratorical contributions were offered by the Mayor of Niagara Falls, and by E. V. Buchanan, George D. Leacock, C. C. Bothwell, A. B. Cooper and R. H. Martindale. Mr. Phelps of Sarnia, accompanied by his lieutenant, Mr. MacLean, contributed a song.

In spite of an attractive menu the various courses at many of the tables had been neglected in favor of an interesting Monte Carlo device that had just been distributed by Mr. C. H. Keeling, and the gambling instinct having been thus aroused, no time was lost in repairing to the Monte Carlo parlors, where for the rest of the evening the program was under the personal conduct of Mr. Leacock.

Monte Carlo.

The Monte Carlo entertainment was a delightfully interesting and absorbing event. Several billions of money changed hands and handsome prizes were awarded the winners—for the most part electrical household appliances. This particular event was staged under the management of Mr. George D. Leacock, who has asked us to submit his grateful acknowledgement to the donors as per the following list: Canada Wire & Cable Co., Canadian Crocker-Wheeler Co., Canadian General Electric Co., Canadian Laco Lamps, Canadian Sunbeam Lamp Co., Canadian Westinghouse Co., Conduits, Limited, Edison Appliance Co.,

Ellis Bros., Eugene Phillips Co., Factory Products, Ltd., Ferranti Electric Co., Lancashire Dynamo & Motor Co., Lincoln Meter Co., Masco Company, McDonald & Willson Co., Crouse-Hinds Co., Moffat Stove Co., Moloney Electric Co., National Conduits, Ltd., National Electric Co., Nineteen-Hundred Washer Co., Northern Aluminum Co., Northern Electric Co., Ohio Brass Co., Packard Electric Co., Renfrew Electric Products, Rogers Electric Co., Square D Company, Standard Underground Cable Co., Swedish General Electric Co., Winter-Joyner Co., W. A. Kribs Co.

Friday Morning.

The morning session of the second day of the convention brought out a most interesting address from Mr. J. W. Purcell, Farms Engineer of the Hydro-Electric Power Commission of Ontario. Much interest has been aroused, not only in Ontario, but at many other points of the Dominion, by the announcement that the engineers of the Ontario Hydro Commission are now ready to proceed with the construction of rural lines to serve groups of farmers, transmission being made by cables placed underground. Mr. Purcell outlined this scheme very thoroughly, basing his remarks on a letter which had been prepared for distribution to the various municipalities interested, and which was reproduced in the July 1 issue of The Electrical News. Mr. Purcell announced later that work would commence within the next few weeks on an underground distribution system between Queenston and Niagara-on-the-Lake, where sufficient contracts have already been signed up to assure the necessary revenue. As already pointed out in The Electrical News, Mr. Purcell explained that the 2300/4000 volt 3 phase distribution was still to be overhead, but the single phase 2300 volt branches leading to any farmer's buildings, or any group of farmers' buildings, will be laid underground on the side of the roadway, from 12 to 18 inches below the surface.

Mr. Purcell has spent a number of years studying rural conditions, and the stories he told, illustrating the desire of the farmer for electric light and power, and the ingenuity he frequently exercises in securing it, were most interesting.

Friday Afternoon.

Mr. W. C. Cale, assistant laboratory engineer, Hydro-Electric Power Commission, read a most interesting paper on "Safe-guarding the Users of Electrical Appliances." Mr. Cale's paper was somewhat along the line of a quantity of correspondence recently appearing in our pages, a very clever and complete review of which formed part of the paper.

The Baseball Match.

As a purely entertainment feature the baseball match ranked second only to the Monte Carlo entertainment of the evening before. Nominally it was a contest between 60 cycle and 25 cycle, captained, respectively, by Mr. L. G. Ireland and Mr. George D. Leacock. The following extract from a letter received from one of the onlookers may possibly assist the members to decide upon the relative merits of the two teams:

"As you were not at the baseball match, might say that the cup in the pictures is the Ireland-Leacock Trophy, which has been presented to the league by Mr. George Leacock, but which has to be won for one hundred successive years before

either the Leacock or Ireland team can secure possession.

"There was some doubt as to whether the 25 cycle or 60



M. J. McHenry, President Municipal Electrical Utilities Association

cycle team won, and there was a suspicion of crookedness on the part of most of the players. Some of the runs were made

the wrong way round, and on several occasions the home run was made en masse. We noticed some of the runners trying to get home through a line-up of fielders, who evidently thought it was a game of tag. The game was ultimately decided by throwing the dice from the cup.

"Most of the figures in the pictures were official umpires.

"Undoubtedly before the cup is actually carried off the teams will have improved in their form both physically and morally."

Friday Evening.

Friday evening was given over to an informal dance, though many of the delegates took the opportunity of testing the good roads along the Niagara River and viewing the wonderful scenery for which the Queen Victoria Park Commission has made itself justly famous

The Chippawa Development.

The climax of a very successful convention was reached on Saturday morning when the delegates en masse were shown over the construction work of the Chippawa development scheme. The amazing thing in connection with this work is the rapid progress that has been made on such a colossal undertaking. The engineers are confident the first unit will be turning not very long after September 1. Mr. F. A. Gaby, chief engineer of the Commission; Mr. E. T. J. Brandon, chief electrical engineer, and Mr. Harry G. Acres, chief hydraulic engineer, to say nothing of a host of others who have given loyal and valuable service, with perhaps less recognition, have, we trust, reason to congratulate themselves that the chief of their difficulties have been overcome.

Service in Merchandising

Keep the Customer Satisfied and the Appliance Operating Satisfactorily and Continuously after the Sale has been Made. Repairing Must be Done Promptly. W. G. Blay Manager London Appliance Dept. Outlines Local Policies

Service, although a small word, has a very large meaning, which, when properly used, guides the success of any retail business, whether privately or publicly owned.

The reputation that any store receives is based on the kind of service rendered to the buying public, and as we all realize that "mouth to ear" advertising by satisfied users to prospective buyers yields the best results, it is desirable and necessary that in order to make a success of any retail electric shop, particularly one publicly owned, a first-class reputation should be enjoyed, and this we have found can best be obtained through the sale of only first-class merchandise backed by real service.

Service can be rendered in many ways, but the most vital in the electrical business is to keep the customer satisfied, and the appliance operating satisfactorily and continuously after the sale has been made. The smaller appliances can best be taken care of in the service department in connection with the shop, and should not be taken from the building in which the shop is located in order to be repaired. It is necessary to have all small repairs such as irons, toasters, cords, etc., in readiness for the customer within at least twenty-four hours after their having been brought in.

This we have found can be done to best advantage by maintaining a department for this purpose, and in this department employ only men who know their business as service men. When an appliance is brought into our shop it is carefully tagged, the stub of which is given to the customer in order that there will be no confusion or doubt as to his receiving the

same appliance as the one brought in. These appliances are then taken to our service department, which is in the same building as our shop, and after being repaired are inspected by the man in charge of the service department, who is then held responsible for the durability of the repair. These are returned to the sales department, where they are always available, thereby eliminating any waste of time on the part of the clerk or customer.

This system we have found to be entirely satisfactory, and takes care of approximately 5,000 repairs yearly from our inside service department. A number of repair tags and service call slips as used in our service department are available for anyone interested in this branch of the work.

Service calls of an outside nature are very important and require a great deal of attention. Most of these calls are urgent ones—washing machines generally require attention when your customer is in the midst of her work. For this branch of the service it is absolutely necessary that only conscientious, courteous, reliable men who understand and always maintain that necessary "at your service" attitude towards the public. It has been our experience that on this particular work men who are not tactful, in a great many cases, have a tendency to leave the customer with a doubt in her mind as to the quality and efficiency of the appliance which she has purchased. We carry in stock at all times a complete line of repairs for all appliances sold, which enables us to give the customer a quick, satisfactory service. We find it good business to carry spare motors for the various washing machines

handled, as no customer should be kept waiting until the motor taken from her machine has been returned to the manufacturers for adjustment.

We have some 1,500 electric ranges connected on our lines, and find it advisable to keep men on this work alone, as the range is one appliance that must be kept in operation continuously, and in order to keep the customer satisfied all stove repairs should be made within twenty-four hours after the call has been received. Men on this work when called into any locality should also examine any ranges in that immediate vicinity, and in this way oftentimes save a second trip. This also impresses upon the customer that you are interested and desirous to give them service at all times, even though you were not called to service their particular range.

A great service can also be rendered at the time the sale is being made. For example, when selling an electric range, if you are in a position to quote a price of, say, \$150.00 for the range installed you save the customer needless worry such as arranging for inside installation and change of outside service; all of these arrangements should be and can be taken care of by the Sales Department, with whom the customer has now become familiar and to whom he looks for all service in connection with the transaction.

We have a follow-up system which keeps up familiar with every range transaction from the time the range is sold until it has been installed in the home ready to operate. This system (which can be best handled by the telephone operator, due to her being in close touch with all departments) consists of a book alphabetically arranged, giving customer's name and address, date of sale, date of installation, date of inspection and date of change of outside service. An entry is made when the range is sold and is followed daily until the work has been completed. Should there be any delay in any one of the departments involved it can be detected at once, for example: To demonstrate the service we are able to give with the above system, and also due to the co-operation which exists amongst our various departments, during the month of May we were successful in disposing of 156 electric ranges, nearly all of which were installed and in operation before the end of the first week in June.

We are so situated as to be able to do all plumbing and wiring in connection with electric water heaters and electric pumps due to our association with the Waterworks Department. This service we find is greatly appreciated, as our men from experience understand this work and are able to make the installation complete, much to the satisfaction of the customer.

We all realize that it is essential to keep the customer's interest in mind at all times in order to be assured of his continued patronage and good-will, without which it is impossible to make a success of any retail business. In our opinion, the slogan used by the Rotary Club is most appropriate for any retail electric shop, it being: "He profits most who serves best."

Gentlemen,—These are times in which many are prone to tell a sad story of hard times, no business, tight money and general pessimism, but we have demonstrated in a manner that is open to no question that the business is there waiting for those who have the courage and resourcefulness and energy to go after it. The people of Ontario, particularly of the Niagara zone, know the benefits of cheap electricity. Probably in the Niagara zone they need to be told, and told repeatedly with positive conviction that the days of power shortage have gone, and that a limitless supply of energy is available from Chipewawan to meet every industrial, commercial and domestic requirement. The urgent necessity of developing a market for additional power at this time is a contributing incentive to launch a vigorous campaign to increase sales. Go after news paper advertising in a big, yet prudent, way, and if your

campaign is well directed your shop will secure a flood of prospects that will give the quietus to hard time talk, expand your sales and your profits and inspire the electrical trade of your whole community with a spirit of optimism that will reflect itself in every municipality, and that will accumulate a force inextinguishable even in the "dog days."

Electrical Merchants' Association of Ontario

At a meeting held at the Clifton Hotel on June 24th, it was moved by G. B. Grinyer, Galt., Ont., seconded by G. Huether, Hespeler, Ont., that the electrical trade form an association called "The Electrical Merchants' Association of Ontario." Carried.

Moved by O. S. Leyes, seconded by J. Frampton, Niagara Falls, Ont., that E. B. Fewings, Galt., Ont., act as president pro tem; and that J. H. Sandham, St. Catharines, Ont., act as secretary pro tem.

The following were appointed provisional executive: G. B. Grinyer, Galt., Ont.; W. H. Pinkett, Galt., Ont.; Gus Huether, Hespeler, Ont.; O. S. Leyes, Kitchener, Ont.; J. Frampton, Niagara Falls, Ont.

Moved that an organization meeting be held at the Royal Connaught, Hamilton, July 6th, at 2.30 p.m. (standard time), and all the electrical trade be invited to send representatives.

Mr. Sandham states: "The association is formed for the elimination of the unfair retail merchandising of the municipal Hydro Commissions."

Advertising and Selling Policies

On convention assembled at the Atlanta Advertising Convention of the Associated Advertising Clubs, the Associated Retail Advertisers' Conference made the following recommendations pertaining to advertising and selling policies:

1. That merchants entertain a conception of their stores, not primarily and solely as money-making businesses, but as semi-public institutions with distinct and increasingly definite duties—a recognition that SERVICE must go before profit—for good profit inevitably and only follows upon good and economical SERVICE.
2. That merchants substitute modern, scientific analysis and methods of management for the old, wasteful, hit-and-miss, rule-of-thumb, good-enough-for-father, custom-of-the-trade point of view.
3. That selection, training, management and compensation of store employees should look to the happiness and development of the latent power of each and every individual.
4. That speed and economy in distribution be the goal of every merchant and that logical analysis of potential demand with the adoption of modern buying and selling methods to meet these trends follow as their natural corollary.
5. That honesty in goods be put above price—that service and satisfaction be put first, and price second—that retailers devote their efforts to exploiting the goods rather than their cost.
6. That the reconstruction of advertising and sales policies be undertaken at once to build public confidence by the gradual elimination of comparative prices.

Mr. Arthur W. Berresford, president of the American Institute of Electrical Engineers, and vice-president and general manager of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., visited Vancouver on Wednesday, June 29th, in connection with Institute matters. Mr. Berresford is making his tour of all Pacific Coast sections of the American Institute after the annual conference in Salt Lake City during the week of June 20th. Mr. Berresford is on his way to California, where he intends to spend a holiday before returning east.

Safeguarding the Users of our Household Electrical Appliances

With reference also to various Industrial Hazards. Remedies Suggested include Education of Public, Improving Construction and Conferences among Men of the Industry. Appliance Must be Grounded with either 3-wire Cord or Polarized Plug.

By W. C. CALE, Assistant Laboratory Engineer, Ontario Hydro Comm.

By the term "electrical appliances" is usually meant those devices, mostly portable and therefore connected by means of flexible cord to a supply circuit, which utilize electricity in the form of heat or of mechanical power to give service of a definite character to the user of electricity in the home, office or factory. Such devices as electric toasters, irons, soldering tools, radiators, fans, washing and cleaning machines, etc., are all classed as appliances, in this sense.

In considering the use of electrical appliances there must be included the outlet from which the current is derived to operate the device and the necessary wiring and distribution system on the premises to bring the current to that point. So that a broad view of this subject might include a study of the method of distribution of the current and of the fittings and material used therefor. It will probably not be necessary however, to enter into an extended discussion of the means of distribution because these systems are already standardized to a high degree. The various systems used in the wiring of residences, office and factory premises, etc., have been carefully worked out by the framers of the National Electrical Code and latterly in this province by the Rules and Regulations Committee of the Hydro-Electric Power Commission and are published in great detail. The electrician making use of these rules is furthermore required to submit his finished work for inspection so that the hazards which at one time existed due to defective wiring have to a large extent disappeared. Moreover, the user of the electrical appliances does not in general come into contact with the wiring or the fittings and material used by the electrician and except at the outlets or at the control devices there is practically no life hazard attached to this part of the job. Our main theme will therefore be confined to a discussion of the hazards to be found in the portable appliances previously described and of the means taken or to be taken to eliminate them.

In the past and at the present time most of these appliances have been offered for sale to the public through the agency of stores of many kinds throughout the country. This very fact has made the problem a much more difficult and complex one than it would at first sight appear to be. Through the medium of such stores which range from the beautifully fitted appliance shops of the larger electrical distributing systems to the corner drug store and the small struggling hardware store, which sells an occasional iron or toaster as a side line, the distribution of electrical goods direct to the public is carried on. It may be assumed that the majority of those who become the users of these electrical appliances are only dimly acquainted with the theory and construction of the device they have purchased. That is, the ignorance of the user makes it imperative that these devices put into their hands be as near foolproof as possible.

This brings us to the question, "From what dangers or hazards is it necessary to safeguard the user?" To answer this question one would have to discuss in detail the various types of appliances in use and point out their weaknesses or potential weaknesses, but generally it must be admitted that appliances as they are put out today are not 100 per cent

foolproof. There are hazards to life and property to be guarded against in the production of most electrical devices and, it is the elimination of these hazards with which we are here chiefly concerned. The manufacturer must use certain safeguards in the construction of his devices such as electrical insulation, heat insulation, if it is a heater, and adequate strength and durability of mechanical parts.

There are others interested in this problem, however, and it would be well at this point to discuss the relationship of the various sections of the community who should have a part in same.

Responsibility for safeguarding the user of electricity rests upon all concerned with the supply of electricity and electrical appliances, upon the government, and upon the consumer himself.

The manufacturer shares this responsibility. He can acquit himself of it by exercising care in design and construction. The former requirement involves adherence to safe and standard methods of design as laid down by good engineering practice and as set forth in rules promulgated by inspection authorities and following practice generally accepted as embodying minimum requirements consistent with safety. The latter requirement involves careful attention to factory processes, and rigid inspection. The manufacturer can also aid in educating the public in the proper use of electricity by judicious advertising and by proper directions when necessary for the use of his product. Advertisements to the effect that certain devices may be attached to any lamp socket may be productive of danger, as both the sockets and branch circuits of most of the older residential installations are not adequate to the demands which would be imposed upon them by the unrestricted connection of devices to lamp sockets. The consumer should rather be encouraged to provide convenience outlets, and a statement by the manufacturer of the power consumption of his devices will aid the consumer in the safe use of such devices.

Contractor-Dealer Responsibility

The electrical contractor-dealer shares in the responsibility for educating the public and being in closer touch with the ultimate consumer than any of the other parties, his opportunity and responsibility are on that account greater. He can assist primarily by selling only approved goods, and thereby giving the public a product which is designed and constructed in accordance with sound and safe principles. He can also disseminate useful information regarding the proper use of electricity and to that end should be informed as to the regulations which are of direct interest to the consumer.

The commercial and technical organizations have a direct interest and responsibility in safeguarding the user of electricity. The sale of sub-standard goods will ultimately react against the use of electricity and is obviously not to be desired from the point of view of the merchandising agencies. It is therefore in the interests of the manufacturers', dealers' and jobbers' organizations to discourage the production and sale of such goods by co-operating with inspection authori-

ties in the carrying out of the regulations.

The interest of the central station lies in the desire to avoid undesirable conditions on its lines caused by the connection thereto of devices which may by failure cause breakdown or interruption of power or which may by reason of design be objectionable from the point of view of voltage regulation, power factor, unbalancing of circuits, etc. Since many central stations maintain stores they share the responsibilities of the contractor-dealer referred to above. They may also be of service to the consumer in maintaining repair departments adequately equipped and under competent inspection.

Responsibility for safeguarding the user of electrical devices rests also upon himself, as much as upon any of the other agencies. His responsibility lies in the proper use of the devices supplied to him. Hazardous features in devices may be reduced to a certain point by care in design, manufacture and inspection, but misuse may introduce hazards against which it is impossible to provide. The consumer should guard especially against shock from the use of appliances in damp places, and in the overloading of sockets and branch circuits. He should also keep all electrical devices in good repair and not attempt repairs himself but have them done by a competent agency. The continued use of defective apparatus has resulted in several fatalities in this district within recent years.

The government's responsibility may be classified under the head of Public Safety. Its duty is therefore to make such regulations as are necessary to secure and maintain safe standards of construction. This involves the preparation of specifications for test and construction, in the examination of the manufactured product, and in the periodic inspection of the same.

In the Province of Ontario the government's responsibility has been deputed to the Hydro-Electric Power Commission and by authority granted to the Commission under the Power Commission Act an Inspection Department and an Approval Laboratory have been established to carry out this duty. It is not the intention here to go into details of the operation of either of these sections of the Commission's activities. The former is, I believe, quite familiar to all of you and the latter was very thoroughly described at the winter convention of this association in January last by Mr. W. P. Dobson. A few points should, however, be touched upon here to show how these two sections work together to safeguard the user of electrical appliances.

Divided into three classes

The regulation of the manufacture, distribution, installation and use of electrical apparatus and material generally may be divided into three divisions:

1. The approval of their design and construction.
2. Regulation of their sale and distribution to prevent the placing of unsafe devices in the hands of the public.
3. Rules for their installation and proper use.

As will be seen the Approval Department is asked to co-operate with the manufacturers in connection with division 1, the Inspection Department with the contractors and dealers and central stations in regard to division 3, while both of these departments are concerned in the enforcement of such regulations as may be necessary under division 2.

In Mr. Dobson's paper the method of procedure in the approval of electrical apparatus and material was outlined and the Re-examination and Follow-up service by means of which a check is kept upon the product of manufacturers using this approval service, was described. It was also shown that the standards and specifications in use in the Laboratory were to a large extent the same as those in use by the Underwriters' Laboratories of Chicago, thus eliminating as far as possible, special requirements and assisting manufacturers to produce goods which will be acceptable not only in Ontario

but in other sections of the country as well. Without going further into the detailed working of the Laboratory in general it may be of interest to show what we are doing to render portable appliances for which no specifications have previously been issued, safe for the user.

Portable appliances in general fall into two classes, heating appliances and motor-operated devices, and the personal hazards incident to them may also be classified as of three general types:

(a) Electrical hazard—shock—from defective insulation or exposed live parts.

(b) Mechanical hazard—injury—from exposed shafting, gears, belts or broken mechanical parts.

(c) Fire hazard—burn—from improperly designed portable motors and transformers as well as from heating devices of a variety of types.

To eliminate these as far as possible is the duty of the Approval Laboratory in co-operation with the manufacturers. And with the Approval Laboratory, of course, is coupled the Approvals Committee whose advice is sought and criticism invited on all reports made by the engineers of the laboratory.

Defective Insulation

Protection against possible defective insulation is mainly provided for by ample clearances where live parts are not fixed and by the provision of a rigid connection where clearances are small as in some heating appliances together with a large factor of safety in design of the insulating medium itself. For portable heaters or stoves of less than 660 watts capacity a voltage test between conductor and frame of 600 volts for one minute is given to the submitted sample after it has run at full heat until temperatures have become constant on its various parts. Each manufacturer is afterward required to test each piece produced in duplicate of this sample with not less than 500 volts before shipping same from the factory. Small motors used in washing and other cleaning machines are required to pass a similar test at 900 volts and each motor must be so tested after assembly to insure that the insulation has not been damaged in any way.

Another feature in connection with the elimination of the electrical hazard consists in the examination and criticism of devices where current-carrying parts are exposed to accidental contact. Among points which have been discussed with various manufacturers are the lack of proper protection around the terminal pins on devices, such as irons and toasters, exposed terminals or brush holder caps on small motors, and incomplete insulation of live parts around cut-out bases in ranges. Since the inauguration of the Approval Laboratory a considerable improvement has occurred in the standard of construction of several of these lines of appliances, and the user is thereby protected in the use of same.

There are certain machines electrically driven, such as washing machines and vacuum cleaners which by reason of the fact that they are placed in the hands of ignorant persons must be made almost foolproof. There is an added danger with the washing machine in that it is used in a large number of cases in damp basements where the electrical hazard is a very real one. In conference with the manufacturers of washing machines a specification was drafted and adopted by the Commission in September, 1920, covering the minimum requirements for the design and construction of washing machines driven by electric motors. It is not claimed for this specification that it is perfect yet but since it was issued and put into force considerable progress has been made in the elimination of both the mechanical and electrical hazards from such machines. Until some effective means of grounding the metal frames of such devices is agreed upon it is required that the motor used on a washing machine must be thoroughly insulated from the metal work and effectively isolated so that the user could not accidentally touch it—it is

considered that it may become a source of danger from defective insulation at some future time.

In taking care of possible mechanical defects in devices which are presented to the Laboratory for review, the device is subjected to such usage, rough or otherwise, which it would normally receive in service and note made of any tendency to fail in any part of it. All revolving parts in motor-driven equipments are required to be guarded so that the user's clothing may not be caught and injury more or less painful result. The purpose of the Approval Laboratory has been to eliminate all danger as far as possible and to make the stamp of approval of the Hydro-Electric Power Commission a real safeguard in itself.

Hazard from fire in electrically-heated apparatus may not be wholly guarded against. Where there is sufficient heat to boil a kettle and fry a chop or make toast there is sufficient heat to set fire to combustible material. So that portable cooking appliances can not be said to be free from fire hazard but they can be made relatively safer to use in the home than gas or oil-heated apparatus used for the same purposes on account of the elimination of the open flame. Air heaters on the other hand must be so designed that they will not ignite cheesecloth thrown over them nor ignite the carpet by reason of being overturned face down on the floor. Tests are made on each heater submitted to check these points. If the heater is of large capacity the heating element must be designed to operate at the proper temperature and the enclosing case made large enough to meet the required conditions of the test.

Specification being prepared

A specification is in course of preparation which will endeavor to set minimum requirements for the construction and tests of portable heating appliances of both these types. The difficulty of preparing such a general specification may be realized when one considers the variety of designs not only in shape and style but in means of supporting and insulating the heating element which is found in appliances offered for sale to the public today.

Any system of approval of electrical appliances which did not take into consideration the regulation of their sale for the purpose of barring unapproved devices and preventing their distribution would fail to receive the support of the manufacturers who were subscribing to the approval service. If no attempt were made to control the sale of poorly constructed and unsafe appliances the manufacturer of shoddy goods would have an unfair advantage in competition with the manufacturer of approved lines. The Commission has power to control such sale and distribution, however, but has not as yet been called upon to exercise it. It would not hesitate to do so however if it were shown to be in the interest of public safety to ban certain appliances from the Ontario market.

There has been a large number of appliances and fittings for wiring offered for sale, many of which were not necessarily hazardous in construction, but which had not been submitted to any approving body for test and examination. According to the regulations these have also been classed as unapproved and until placed on the approval list cannot be legally sold in this province. Many of these devices were made in the United States and the distribution thereof is somewhat more difficult to control. It has been our custom in the past to gather information from various sources regarding the appearance of unlisted goods in Ontario and to notify the manufacturer of the regulations suggesting that he attend to the approval and listing of same at once. In case the manufacturer has received approval from the Underwriters' Laboratories and there is no objection to the use of devices of that character in this province he then makes application for listing in the records of the Hydro-Electric Power Commission at a nominal fee which merely covers the

expense of checking up the record card or cards and having them printed.

With all our regulations, however, and the co-operation of the Inspection Department in the checking up of the sale and distribution of unlisted devices it has not been possible as yet to say that everything electrical which is offered for sale in Ontario has been approved. Dealers and central station managers could assist in bringing about this much-to-be-desired state of affairs by being careful to specify on all orders for wiring supplies for portable appliances and electrical apparatus of all kinds, except that which is to be installed in public substations and power houses, that it must be approved by the Hydro-Electric Power Commission. A request for the approval number applying to the article ordered would soon show whether the device was actually on the approval records and this information if doubted could be verified from the card index at the nearest inspection office. It is hoped in the next few months as the record is now nearing completion to issue a printed approval list for general distribution. In the meantime information regarding this list will be cheerfully given by the district inspectors or by the Approval Laboratory.

The function of the Inspection Department in regard to the use of portable appliances is more in the regulation of provision for proper outlets from which they may be supplied. This was briefly touched upon in the opening remarks and will be enlarged upon in the concluding section of this paper. Suffice it to say at this point that the Inspection Department co-operates very closely with the Approval Laboratory in this connection, members from one department having been appointed to the advisory committee of the other department. At the present time a general revision of the Rules and Regulations for inside electrical installations by a sub-committee on which the Approval Laboratory is represented is underway and it is hoped that when this is finished that both the regulations for approval of devices and the rules for their installation will be found to have been simplified and brought more into line with the advanced ideas concerning the safeguarding of the consumer in his use of appliances.

Fatalities in damp localities

The fatalities due to the use of defective appliances in the home which have been reported during the last two or three years have invariably occurred in bathrooms or similar locations which are known for want of a better term as "damp" locations. In this province and in fact in the majority of cities on the continent, the middle or neutral wire of 3-wire secondary distribution systems is permanently grounded thus making it possible for one to receive a shock by coming into contact with only one of the outside wires while at the same time touching any water pipe or other grounded metal work in the house. In fact shocks from 110 volt sources are rendered more numerous on account of the grounding of the secondaries. It does of course offer protection against high voltage currents straying into the house wiring if the grounding is improperly done and of low resistance. Any defect in the house wiring itself is also discovered at once by the opening of the fuse protecting the circuit in trouble. While the protection afforded by the grounding of secondaries is therefore very necessary it has made the problem of safeguarding the user of appliances a very difficult one with our present system of wiring.

The discussion which has been carried on by contributors to the pages of the Electrical News in the past five months has brought forward several more or less valuable suggestions. A summary of these suggestions may perhaps be of service. The question which those who contributed to the discussion were endeavoring to answer was briefly stated as follows: "What is the best way to prevent further bathroom fatalities?" In this discussion it was soon seen that any system which would prevent bathroom fatalities would prac-

tically solve all problems connected with accident hazards due to electricity in the home. The remedies suggested take three main lines: (a) education of the buying public or the users of appliances; (b) rules and regulations in regard to the construction of appliances and to the wiring of outlets for their use and, (c) conferences and conventions among members of the electrical industry for the discussion of these topics, such as the present one which I have the honor to address.

Educate the consumer

Much stress was laid upon the education of the consumer or the buying public so that he may know the safe types of appliances to buy and how to care for them and use them properly. The first need can be supplied by the issue of a list of approved appliances and the proper marking of appliances approved by a recognized authority. Such a list is issued by the Hydro-Electric Power Commission and has been already outlined in this paper. The second need is rather more difficult to supply and the various suggestions for meeting it have to some extent been already touched upon but will bear repeating.

1. Appliances offered for sale should bear warning tags marked "Dangerous to use where there is liability of touching water pipes or other grounded metal." These tags should be supplied by the manufacturer.

2. The dealer in making the sale should advise the buyer carefully on the proper use and care of the device.

3. The central station or supply authority should keep the consumers advised of conditions under which appliances become dangerous and of the need for proper maintenance and repair of them.

Several methods for carrying these messages to the public were suggested:

- (a) Printing same on the electric light bills.

- (b) Where a regular bulletin is issued for purpose of increasing the sale and use of appliances space should be found there for cautions as to their use.

- (c) A definite safety campaign by means of carefully worded messages in simple non-technical language on cards to tuck in with the electric light bills would be of great value in most communities. Such a campaign was put on in the town of Listowel recently and some of the cards used reproduced in the technical papers.

4. The safety message should be carried to the children in the schools. This is being done by the Ontario Safety League, who have recently issued electrical bulletins which should be placed in the hands of every teacher in communities where electricity is in common use.

But Supplement the Education

While the education of the user is apparently the primary need it must be supplemented by every means the ingenuity of the engineer can suggest for the elimination of the accident hazard. No system of education can be 100 per cent efficient in results produced. Very small children and absent-minded grown-ups will not be protected against themselves with all the printed warnings ever issued. That is no reason, however, why there should be anyone ignorant of the danger in the use of electrical appliances under certain conditions if a system of education will prevent it. Any educational campaign unless very carefully prepared might result in frightening people away from the use of electrical appliances which would be a calamity. Electrical appliances are such a boon to the average householder that anything which would tend to lessen their use would work a hardship which might not be offset by the resulting immunity of the user from accident. It is believed however that such a campaign can be carefully prepared and presented without any such ill effects along these lines so let no one hesitate on that account.

As a supplement to a scheme of education various rules

and regulations have been suggested, some relating to the construction of appliances, others to the wiring of premises and still others which involve both. First, in regard to the construction of appliances.

1. It is claimed that much improvement is needed in the design and construction of portable appliances especially in regard to the insulation used therein. The more general use of porcelain in place of mica for bushings and supports is advocated as the former cannot be so readily tampered with and "fixed up" by the "handy man" around the house. This is especially desirable in the construction of all air heaters which have been responsible for the most of the fatalities reported.

2. A more rigid system of inspection of the design and construction of appliances and the banning of the use of those of faulty design is also suggested. In Ontario it is believed that the system of approval, testing and inspection outlined has already begun to show definite results. It must be admitted, however, that there are many devices still in use which were originally defective in design or construction but were produced before the approval service went into effect. These devices will probably be used until the public is educated to the point of replacing them by safer and more efficient ones.

3. The repair of appliances by amateur or irresponsible persons is recognized as one of the problems involved. A suggestion has been made that it be made illegal to repair any electrical appliance except with the proper parts or material. To the writer this hardly seems feasible. The licensing of shops where such articles might be sold and repaired would perhaps solve this problem to a great extent.

The wiring of Outlets

Secondly, in regard to the wiring of outlets.

1. The placing of outlets in hazardous locations has not received the attention it should have from the proper regulating bodies. The old National Electrical Code was principally concerned with reducing the fire hazard and did not take into account the installation of wiring and outlets to prevent accidents to persons. In recent years there has been a tendency to alter this point of view due to pressure from many quarters but it is still a question whether the Safety Code would not be better enforced if separated from the Fire Code. A suggestion made on account of this inflexibility of the National Electric Code rules is that it be made illegal for a lighting or central station company to supply a building where outlets have been placed in dangerous locations in bathrooms or basements or near water radiators or other grounded metal work. The Ontario Rules do take this into account to some extent but might go further along that line. In a Western city all bathroom lighting outlets are required to be placed on the ceiling and switches placed out of reach of any person touching a water pipe or in any way liable to be connected with ground.

2. Probably the most effective means of preventing accidents from electrical appliances would be the enforcement of rules requiring that the metal frame of each appliance should be effectively and permanently connected to ground. Rules are now in force requiring that stationary appliances shall be so connected but it is recognized that at the present time no effective means are in general use for the connection of portable devices. Suggested means of doing this were two in number.

- (a) As required by the National Electric Safety Code, the appliance should be provided with a 3-wire cord and plug and the outlet fitted with a three-point receptacle so arranged that one point is connected to ground. The prong in the plug corresponding to this point should be connected with the frame of the portable device and means provided so that it could not be connected except to this point. As will be seen this would entail the provision of a ground bus through-

out the installation as it would hardly be feasible to make corrections to water or gas pipes at each outlet. The cost of such a system would therefore be much greater than present systems. Unless all convenience outlets on the premises were provided with 3-point receptacles and all devices equipped with proper plugs and cords there would be confusion in the use of appliances on the proper receptacles as there has been in the past due to the multiplicity of types. If it is necessary to provide still another type for somewhat general use the problem of standardization of these fittings will not be advanced but rather retarded.

(b) The second method would employ polarized receptacles and plugs and would provide that the frame of the heater be permanently connected to the grounded side of the circuit. This would require that polarity be marked at all outlets and that all fittings be also arranged so that the grounded side could be readily recognized. The use of plugs of the so-called "convertible" type would not be permitted with such a system as by simply changing over the prongs on the plug the frame of the appliance would immediately become a deadly menace. The standardization of plugs would be almost compulsory with this method.

Manufacturers moving in right direction

Approved fittings are already on the market by the use of which either of these methods could be put into general use when required. Sockets, receptacles, etc., are also being marked by some of the manufacturers in the United States to assist in maintaining a uniform schedule of polarity, oxidized terminal screws being provided at the point where the grounded wire should be attached. The last issue of National Electric Code contains two rules which should assist greatly in putting into effect a polarized system of receptacles. All twin conductor wire and cable is required to be marked in such a way that each wire may be identified where necessary at any point throughout its length. The previous or 1918 edition contemplated putting into effect a rule requiring that the neutral conductor in all 3-wire and one conductor in all 2-wire circuits be marked with an identifying insulating covering readily distinguishing it from other wires. This rule has been withdrawn for the present, however, in favor of the one just mentioned. While the present rule is the entering of the wedge of an improved scheme of wiring it does not go far enough in the writer's opinion and he would like to see the 1918 rule put into effect as soon as the necessary wire

could be produced by the manufacturers. Furthermore, the 1920 Code rule on fixture wiring requires that fixtures with metal shell sockets must be wired and the wiring marked so that the inner screw shells may be connected to the grounded side of the circuit. It may be stated here also that such a rule has been placed in the tentative fixture specification recently drafted by the Approvals Committee of the Hydro-Electric Power Commission. It would thus seem to be logical to carry the polarizing idea a step further and require all plug receptacles and plugs to be polarized as well as sockets and fixtures. It would seem from this discussion that no other means so far suggested would as cheaply and readily provide for the grounding of frames of all portable appliances with the desired protection to all users whether ignorant or well-informed of the dangers accompanying their use.

Must ground properly

Critics of the polarized system of wiring and the connection of non-current carrying metal parts of devices to the grounded side of the circuit will perhaps not agree that this scheme will render appliances 100 per cent safe. It is certain it cannot do so unless the permanent ground connections to the secondary distribution network are well made mechanically and are electrically of low resistance. But where the grounding is properly carried out the scheme as outlined should solve the problem under discussion.

A. I. E. E. President Visits Vancouver

The Vancouver section of the American Institute of Electrical Engineers gave a banquet in honor of the visit of Mr. Arthur W. Berresford, president of that Institute, on Wednesday evening, June 29th, in the Terminal City Club, Vancouver. There were thirty-five members present, and after the dinner was served they adjourned to the board room, where business matters of an international and local nature were discussed with Mr. Berresford.

Among the many interesting demonstrations to be seen at the armories during the "Made-in-Canada" week, held recently in Chatham, Ont., was that of having all the paper money that was taken in washed and dried by an electric washing machine and wringer. This work was in the hands of the Hydro.



The accompanying photo illustrates one of the show windows of the Torontonian Hydroelectric System, which are continuously attracting the attention of the passersby. By the use of miniature houses, the idea that we have become a nation without a well-known Canadian-made suction sweeper is successfully carried out. Incidentally this window was one of the prize winners in the window display contest recently conducted by the Hoover Suction Sweeper Company of Canada.

Electric Heating by Off-Peak Power

Detailed Description of an Experimental Installation where
the Current Consumption was Surprisingly Low.

By R. F. MOODIE, Ottawa.

Since the beginning of our modern civilization man has had in view an ideal system of heating his home, and it is only natural that he should be grieved to think that just when he views the perfect system of his dreams, it should be held out of his reach by its extreme cost of operation and the limited supply of power available for electric heating purposes. Much as we regret the fact, electrical engineers have to admit that electrical heating cannot compete with other systems of heating except, perhaps, in some isolated cases.

The efficiency of the electric heater has not improved any since it was first used, due to the fact that it was always 100 per cent. efficient; therefore, heating engineers have had nothing in the way of lost energy to pick up. Electric heating has gained some headway, it is true, in the last ten years, for the simple reason that power has been developed in larger quantities and sold at a much lower rate, while the prices of other fuels have advanced proportionately. Also, better qualities of wire for heater purposes have been placed on the market, but the efficiency of the electric heater itself has not improved in all those years, because it was always the most efficient piece of electrical apparatus we have had.

After considering all the obstacles, and being reluctant to abandon the possibility of using such an ideal system of heating, it was necessary to approach the proposition from another angle. The off-peak power available seemed to present the most favorable prospect for a supply of the cheap power necessary for this most desirable system of heating if it were to be made a success. This power is not a very great quantity. It will average, from investigations, around one-tenth of a horse power per capita in large centres supplied by power from water power plants. Where the power is produced by steam, this system of heating will be absolutely out of the question. However, while it is not possible that this system will be utilized or available for the people at large, its use is limited to the off-peak power supply, say 40,000 h.p. in the city of Toronto. There will be sufficient power for the favored few who can afford to install and operate this heating system. That there are such people is proven by the fact that all the comforts and improvements have been adopted regardless of the fact that they have been more expensive than the older systems. Otherwise we would be still burning candles and heating our houses with the old box stoves.

One kw. h. will supply 3,413 b.t.u., and it will require about 2 kw. h. to equal one pound of good coal in heating value, allowing 100 per cent. efficiency for the electric heater and 55 per cent. efficiency for the coal furnace. At the present rate the balance appears against the electric heater, but there are other factors to be considered which react in favor of electric heating which are very often not considered, but, it seems to me, should be credited to this form of heating. Practically all the labor and attention is eliminated; the fire hazard is lessened; the building is free from smoke, gas and dirt; the expensive chimney is not necessary, and that part of the basement used for coal storage can be utilized for other purposes. The user is free from an uncertain and fluctuating supply of coal and labor, also the bother of looking after it. In the fall of the year the customer merely has to close the switch, and in the spring open the switch again. The advantages of the above conveniences, I think, are worth the cost of the power to the man whose time is valuable for other purposes.

For the satisfactory utilization of this off-peak power it was necessary to construct a furnace or heater that was capable of absorbing power during the off-peak hours and delivering this power in heat over 24 hours' service.

Fig. 1 is a cross section of my off-peak electric radiator, and consists of a water jacketed hollow cylinder with a central core of cast iron weighing 550 lbs. The outer surface of this heater has a large radiating surface and is not covered with asbestos. Two special heating elements are inserted in the cored holes in the casting, as shown in the drawing. The elements are connected to a three-heat switch. The capacity of this heater is 5 kw. and will run 8 hours in circuit and 16 hours off. On test this radiator heated quite a large room and kept the water at boiling point 24 hours after the power was turned off, proving that this type of heater can be constructed for any reasonable off-peak heating service.

Fig. 2 is a drawing showing a cross section and gives a good idea of the appearance of the furnace. The construction includes a steel cylinder which is covered on the outside with

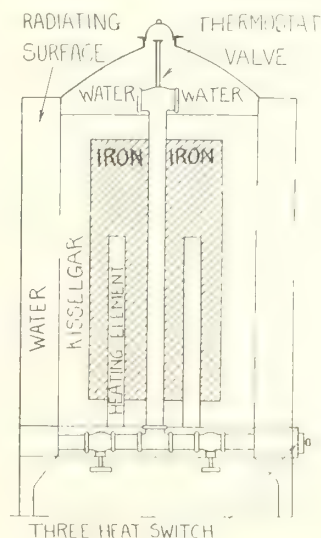


Fig. 1

a heavy coating of heat-resisting material to prevent heat losses in the basement. However, this loss seems to be just sufficient to keep the cellar above freezing point, and this amount of heat is required in most buildings.

The furnace consists of a water jacketed hollow cylinder 3 feet in diameter; a water drum 8 inches deep covers each end. The furnace is standing upright on a brick foundation, with two inches of asbestos between the bottom of the furnace and the brick foundation. A cast iron core weighing 4,800 lbs. is standing in the centre of the cylinder and is completely surrounded by mineral wool. Surrounding this core, and in contact with it, are vertical pipes 1 inch in diameter, which circulates the water from the bottom drum into a header through an automatic regulating valve connecting to the top drum and to the supply pipe connecting to the heater coils. While the furnace is in circuit the special heating elements are furnishing enough energy to supply the heat necessary to keep the building at the proper temperature and also store sufficient heat in the cast iron core to carry the system over

the period during which the furnace is disconnected from the circuit, from 4.00 p.m. to 10.00 p.m., in the test of this particular furnace. While the temperature of the core is rising the automatic valve is closing and not allowing as much water to circulate, the water being at a higher temperature has the same heating value. When the core temperature is dropping the valve opens up and more water is allowed to circulate, allowing the same heat units in the heating system as when the core was at a higher temperature. A temperature of 800 degrees C. in the iron core can be utilized as a maximum without danger of overheating. I have had no trouble from this whatever. Twenty lbs. of iron per kw. h. is used in the core. This weight does not mean the total kw. hrs. required to heat the building over 24 hours, but the kw. hrs. required to carry the heating over the time when the furnace is disconnected from the circuit. Take, for example, a building requiring 30 kw. over 24 hours' service to supply the necessary heat units; during the 8 hours the power is off 30 kw. hrs. x 8 hrs. equals 240 kw. hrs.; 240 kw. hrs. x 20 lbs. iron equals 4,800 lbs. of cast iron necessary to store the heat to carry this furnace over eight hours, the period the current will be turned off.

From my experience with this furnace, the weight of the cast iron core can be further reduced to 15 lbs. per kw. h. by reconstructing the heating element. As it is, I have had this furnace on for 24 hours as an endurance test without any

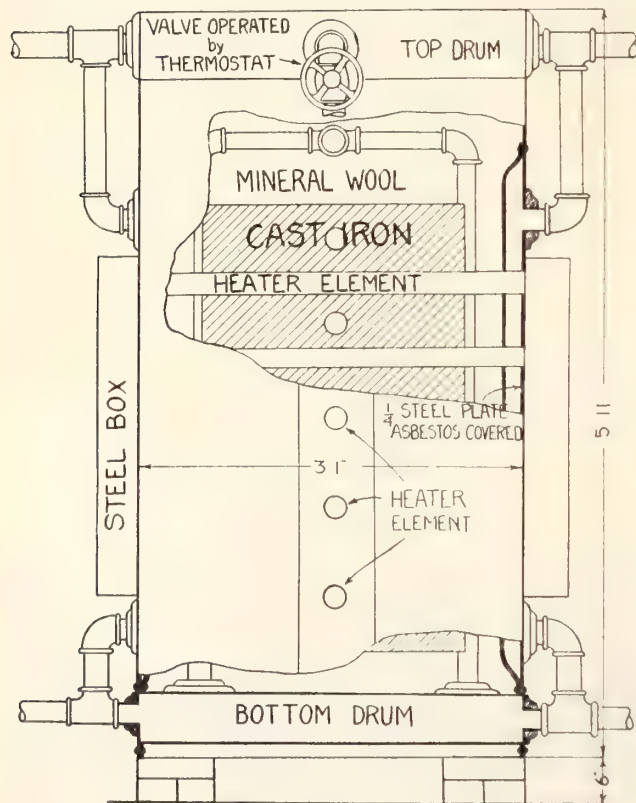


Fig. 2

trouble. A very cheap grade of cast iron is used for the heat storage core, as there is no machine work required on this part of the furnace.

Averaging 30 kw. per dwelling, there is sufficient off-peak power to heat 1,000 average size homes. In the city of Toronto this means a saving of about 225 tons of coal per day, an item well worth going after. The plant and transmission lines are already installed. In most cases for the power company it is just a matter of putting in the loop after the customer installs the off-peak furnace or heater.

The dwelling in which the furnace is installed is a good-sized brick veneer, two storey and finished attic, 7-ft. basement and stone foundation. This is a well built house and requires,

on ordinary winters, about twenty tons of hard coal to heat. The house had a hot water heating system. The winter of the test—1919-1920—was an extraordinarily cold winter, for which the electric furnace should receive due credit. No part of the house was cut off during the test. The cubical content of the house is 39,176 cu. ft., and there is also a solid brick garage of 2,360 cu. ft. capacity, making a total of 41,536 cu. ft. The glass surface is 750 sq. ft with a standard size front and back door. The furnace was started October 1st, 1919, and was continually in service until May 17th, 1920, without any trouble whatever. The house was very comfortable all winter, averaging about 70 degrees F. Occasionally the temperature went a little above or a little below, but the people in the house did not notice the change in temperature. In very cold weather, when the mercury was 22 degrees below zero with a high wind blowing, the temperature in the house went to 60 degrees F., but not for long. Thirty kw. was the highest power recorded. This was on the 15th of December, and again on the 4th of January. This means that the maximum demand was under $\frac{3}{4}$ of a watt per cubic foot, which is a low figure. The kw. h. consumption for the 7½ months was 93,258 kw. hrs., measured on a Westinghouse wattmeter. 93,258 kw. hrs. at 1/3 cent per kw. h. equals \$310.86; at ½c equals \$466.29. 22 tons of coal at \$16.00 per ton equals \$352.00, and 7½ months' labor at 50 cents per day equals \$112.50; \$352.00 plus \$112.50 equals \$464.50. This means that power at ½c per kw. h. is equal to fuel and labor of coal furnace, not taking into consideration the other desirable features which are worth money to the user of this system of heating. Power on the off-peak can be sold at a fair profit at 1/3 and ½c per kw. h., and in some cases at ¼c per kw. h., by the power companies. The cost of construction is about double the cost of a first-class hot water heating furnace, and will not take up any more room in the cellar than the hot water furnace of the same capacity.

Electric Appliance Co. Makes Changes

The Electric Appliance Co., Ltd., Winnipeg, has just changed its name to the Wheaton Electric Co., Ltd. Mr. Wheaton of Saskatoon, who for some months past has been running the Electric Appliance Co., Ltd., with Geo. E. Miles as partner and manager, has taken over the ownership of the business, and appointed H. E. Kelly as manager. Mr. Kelly is very well known throughout Western Canada, having spent nineteen years in the larger western cities, managing some of the largest hardware stores in the west. During the past year Mr. Kelly has been associated with the Wheaton Electric Co., Ltd., at Saskatoon, in the capacity of manager of retail sales.

Mr. Geo. E. Miles has accepted the position of sales engineer for the Canadian Westinghouse Co., Ltd., with headquarters at Calgary. He does not need any introduction to the western trade as, previous to his entering the appliance business with Mr. Wheaton, he spent about ten years with the Westinghouse Co., most of the time being in the service and sales departments.

Mr. H. S. Balhatchet, vice-president Benjamin Electric Company, accompanied by Mrs. Balhatchet, sailed for England a few days ago and will be absent a couple of months.

The Delta-Star Electric Co., Chicago, Ill., are distributing special publication No. 55, devoted to Central Station service for farmers. Copy will be sent upon request.

Continental Electric Company, Ltd., has been formed to manufacture and sell Royal Electric Canners in Canada. The new organization has its headquarters at 507-511 King Street East, Toronto, Ontario.

The Water Power Resources of Canada

A Re-analysis of Available and Developed Powers Places Resources in More Favourable Light—Estimates of Future Development—Principles of True Conservation

By J. B. Challies, Director of the Water Power Branch, Department of the Interior, Ottawa

During the past two years there has been under way in the Dominion Water Power Branch a careful re-analysis and computation of Canada's water power resources. All existing stream flow and power data available from Dominion and provincial sources have been systematically collated, analysed and co-ordinated with a view to preparing on a uniform basis from coast to coast, revised estimates of the power available. While the analysis is not yet finally completed, sufficient progress has been made to warrant the publication of the figures given herein.

The total available and developed power resources are presented in a manner not heretofore adopted. A consideration of the figures will indicate that they place the water power resources of the Dominion in a much more favorable light than have previously published compilations.

While the resources have been exhaustively analysed in so far as the information available will permit, it should be kept in mind that only very meagre data is to hand in many districts and for many rivers.

Basis of Computation.

The figures listed in the accompanying table and diagram are based upon rapids, falls and power sites of which the actual existent drop or the head possible of concentration is definitely known or at least well established. Innumerable rapids and falls of greater or lesser power capacity are scattered on rivers and streams from coast to coast which are not as yet recorded and which will only become available for tabulation as more detailed survey work is undertaken and completed. This is particularly true in the more unexplored northern districts. Nor is any consideration given to the power concentrations which are feasible on rivers and streams of gradual gradient, where economic heads may be created by the construction of power dams, excepting only at such points as definite studies have been carried out and the results made matters of record.

In brief, the figures hereunder are based on definite rapids, falls and power sites, and may be said to represent the minimum water power possibilities of the Dominion.

The power estimates have been calculated on the basis of 24-hour power at 80% efficiency on the basis of "Ordinary Minimum Flow" and "Estimated Flow for Maximum Development." The "Ordinary Minimum Flow" is based on the averages of the minimum flow for the lowest two consecutive seven-day periods in each year, over the period for which records are available. The "Estimated Flow for Maximum Development" is based upon the continuous power indicated by the flow of the stream for six months in the year. The actual method to determine this flow is to

arrange the months of each year according to the day of the lowest flow in each. The lowest of the six high months is taken as the basic month. The average flow of the lowest seven consecutive days in this month determines the maximum for that year. The average of such maximum figures for all years in the period for which data are available is the estimated maximum used in the calculation.

This estimated maximum development is based upon the assumption that it is good commercial practice to develop wheel installation up to an amount, the continuance of which can be assured during six months of the year, on the assumption that the deficiency in power during the remainder of the year can be profitably provided from storage or by the installation of fuel power plants as auxiliaries. The correctness or otherwise of this assumption for any particular site can only be definitely settled by the careful consideration of all circumstances and conditions pertinent to its development. The method, however, enables us to make a fairly satisfactory overall estimate of the maximum hydraulic power available, as distinctive from the estimated ordinary minimum power available.

Available and Developed Totals.

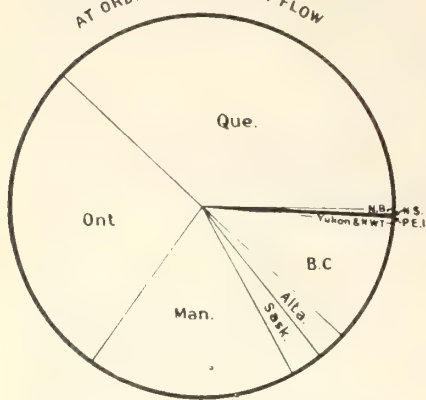
The recorded power available throughout the Dominion under conditions of ordinary minimum flow and within the limitations set out in the foregoing, is 18,255,000 h.p. The water power available under estimated flow for maximum development, i.e., dependable for at least six months of the year, is 32,076,000 h.p. (For details see table attached.)

There are installed throughout the Dominion water wheels and turbines to the extent of 2,471,000 h.p. However, it would not be correct to place this figure in direct comparison with the minimum or maximum available power figures quoted above and therefrom deduce the percentage of the available water power resources developed to date. An allowance must be made for the average ratio between the water wheels installed and the power available.

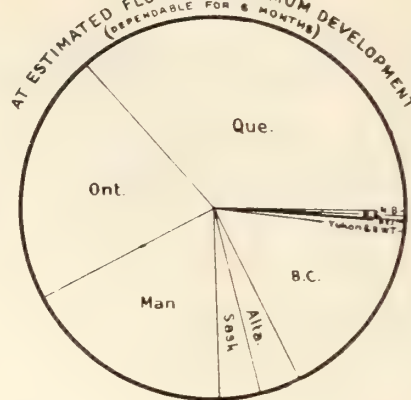
An analysis of the water power plants scattered from coast to coast, concerning which complete information is available as to turbine installation and satisfactory information as to stream flow, gives an average machine installation 30% greater than the six month flow maximum power. Applying this, the figures quoted above, therefore, indicate that at present recorded water power resources of the Dominion will permit of a turbine installation of 41,700,000 h.p. In other words, the present turbine installation represents only 5.9 per cent. of the present recorded water power resources.

In spite of the outstanding facts that financial and

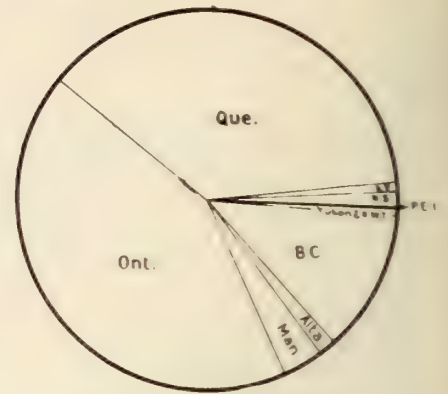
AVAILABLE WATER POWER

DEVELOPED WATER POWER
(WATER WHEELS AND TURBINES INSTALLED)

TOTAL - 18,255,000 H.P.



TOTAL - 32,076,000 H.P.



TOTAL - 2,471,000 H.P.

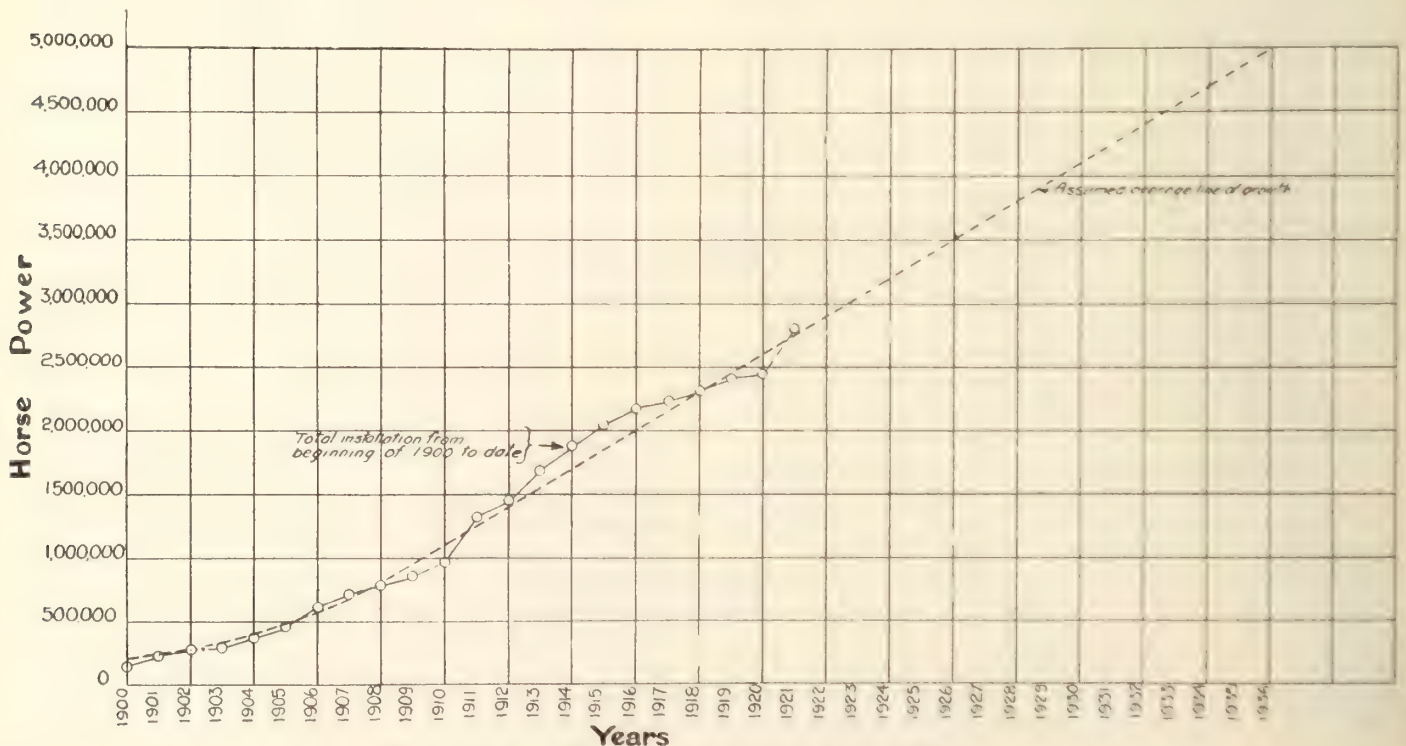
Available water power in Canada on basis of 24 hour power at 80 per cent. efficiency

commercial conditions are still far from normal and that costs of construction are almost prohibitive for but absolutely necessary undertakings, there has been during the past year and is now, marked activity in hydro construction. This has resulted from a variety of causes principal among which is the lack of native coal in the central industrial district and the fortunate location of economic water power sites to industrial centres.

The total hydro power development installed during the past year or now under construction represents approximately 560,000 h.p. of installed capacity. This figure includes only the initial installations of plants under construction, not their ultimate designed capacity. It is evidence of the manner in which the water power resources of the Dominion are being put to effective and productive use.

It is profitable to consider the history of water power utilization in Canada during the past few years

in conjunction with the present activity with a view to making some reasonable forecast as to its probable future growth. Should the rate of water wheel installation during the past fifteen years be maintained there will be installed in 1925, 3,360,000 h.p.; in 1930, 4,110,000; in 1935, 4,860,000 h.p. and in 1940, 5,600,000 horse power. In view of the increasing appreciation of the advantages of hydro power combined with the fortunate location of ample supplies within easy transmission distance of practically every great industrial centre throughout the Dominion, there is every reason to anticipate that the rate of growth in utilization will be accelerated rather than retarded. Reference to the foregoing totals of water power available will indicate that this anticipated increase in utilization will not seriously reduce the total reserves. Canada possesses sufficient reserves of water power to meet all anticipated demands for many years to come.



Graph showing growth of utilization of water powers

Steel Belt Power Transmission

Advantages Outlined in paper by B. D. Potter from which Following is Extracted

The loss in power in transmission from the engine, whether steam or electrical, to the point of application is a difficulty which has always exercised the minds of engineers wherever mechanical power is used. Experimental attempts were made in employing driving belts of metal, but after a short period of use they invariably broke when subjected to any considerable increase in load. Persistent failure also attached itself to the various connections used in joining the ends of the bands together. Subsequent experiments showed that these unsatisfactory results were attributable mainly to mistaken conceptions as to the conditions under which steel bands should be used. In calculating and constructing metal belt gearing on the occasion of previous experiments it was found that consideration was not given to the fact that the metal belt employed is subjected to a flexure constantly varying from zero to a maximum, and that to ensure durability with such a demand it was not sufficient for the belts to be calculated in the usual manner. The error consisted in not regarding the result of philosophical researches first undertaken by Wohler, according to which a tension constantly varying from zero value to a maximum and frequently applied to a body causes self-destruction if the maximum tension is not confined to half the breaking stress of the material.

The present system is therefore based on the knowledge that a fracture of the belt even with a constantly varying demand on its flexibility can be avoided with certainty if the maximum demand likely to occur is kept so low that it does not attain half the value of the limit of fracture. Exhaustive series of trials have been carried out in England. According to the present method the breaking of the belts is avoided, and the durability made unlimited by the thickness.

It was found that owing to the high modulus of elasticity of steel that it was very necessary to determine the length of a driving belt with considerable accuracy; a short extension compelled by cutting the belt too short in the first instance, set up very serious stresses. To accomplish this purpose an ingenious device has been invented for determining the necessary length for the purpose of obtaining a truly correct working tension.

The Joint

In the patented joint clamping plates are shaped to suit the pulley profile, stresses at the joint are distributed evenly over the whole width, and one of the most prolific causes of fracture in the early installations is thus avoided.

The Material

The material used is a carefully hardened charcoal steel, prepared by a secret process, rough rolled at a red heat, and then brought to 0.2 to 0.9 mm. thickness and 12 to 200 mm. in width by cold working. The tensile strength of the finished material is about 95 tons to the square inch. The edges are rounded and finely finished, so enabling the belt to be safely handled even when running at high velocity. The elasticity remains unimpaired with use.

Friction Covering on Pulleys

So that metal does not run to metal and to prevent any possible slip, a friction coating consisting of a layer of canvas, to which is glued fine sheets of cork, is placed over the pulley rim, and to avoid stripping under variable load the pulley rim is first serrated by a rough file or chisel nuts. A special cement is available for use in very damp situations.

Conversion from Rope Driving

Steel belts have to a great extent replaced cotton rope drives in a number of important applications. The simplicity

of the conversion is such that the conversion of a complete rope race can be undertaken on a Saturday noon and be completed with the steel belts ready for running the following Monday morning. The conversion usually increases the horse-power available at the driven shaft by 7 to 25 per cent., this being the result of a number of tests in actual installations. Over 250,000 h.p. of cotton rope drives have already been converted to steel belt transmission. Where space is cramped and drives are running to various floors, steel driving belts will solve many difficulties of the architect and millwright.

The requirements necessary to the successful employment of steel belt transmission are simple, but nevertheless important. Given suitable conditions, the results are definite run perfectly true on to the pulleys, the tension to remain run perfectly true onto the pulleys, the tension to remain exactly as when fitted, the conditions demanded will be easily comprehended. The shafts, bearings and fixings must be of a solid construction, strong enough to transmit the maximum load demanded. The shafts must also be parallel, and the pulleys running true, and without vibration.

Power for power the steel belt is only one-third the width of an equivalent leather belt, the use of specially narrow and correspondingly stronger pulleys enables considerable saving in weight to be made, particularly in large diameters, at the same time reducing considerably the cost.

It should be clearly understood that the steel belt is only a part of what actually is a highly scientific system of power transmission. As already explained, the process of preparing the steel and the mounting of the belts is carried out on highly scientific lines.

Safeguards

With ordinary care steel belts are safer in use than leather or ropes. In case of fracture the belts will not fly, but fall between the shafts. The edges are rounded, and can be handled whilst running. In every country where used they are placed under precisely the same laws and regulations as applied to ropes or leather belts:

1. An efficiency in power delivery of 99/99½ per cent.
2. Great steadiness: a necessity for electrical machinery, textile purposes, paper mills, etc.
3. A perpendicular drive is no disadvantage for steel belt driving.
4. Absence of stretching.—A steel belt does not stretch by use, as has been seen by eight years' experience.
5. Even running, free from slip.—As there is no actual measurable slip, it follows that transmission by steel belts is uniform and invariable.
6. Narrower width.—A steel belt is only about one-third as broad as a corresponding leather belt, consequently the pulleys will not cost so much.
7. Great power under present conditions.—In cases where the pulleys are limited in size it is often possible to get an increased power transmitted by the use of steel belts without any re-arrangement. For example, a firm had a mail drive fitted with ropes capable of transmitting 150 h.p. using all the grooves. Desiring to increase the power to 250 h.p. this was accomplished by the use of one 8-in. steel belt, which occupied only one-third of the width of the rope pulley, thus saving the expense of a new rope drive. Many such examples could be given.
8. Cool bearings.—Owing to the exact calculations of the necessary tension for each particular drive, together with the great reduction in the weight of steel belt as against an equivalent power and weight in ropes or leather, there is a minimum of strain on the bearings, which consequently run cooler.
9. Cleanliness.—No messy dressings are required.
10. Unwearability.—Steel driving belts have now been in operation for eight years, and tests made of the belts

first fitted show no signs of deterioration whatever. It seems evident, therefore, that the life of the steel belt is unlimited.

Breakage.

Where the conditions are in accordance with the requirements, it is only in very isolated instances in which a fracture occurs. These instances are invariably due to a flaw in the material itself and will show within the first eight weeks of running; by this is meant that if a steel belt runs for eight weeks it is a practical certainty that it is free from flaw and will run indefinitely. To cover any serious stoppage caused by a faulty belt, the manufacturers will, if requested, supply with every drive a duplicate or reserve belt, measured and ready for immediate fitting, which is left with the customer.

Steel belts vary in width from $2\frac{1}{2}$ in. to 10 in., and thickness 0.4 mm. to 1.0 mm.

Cost.

Including pulleys drives of steel belts are less expensive than drives of leather belts or cotton rope. Exclusive of pulleys steel belts are considerably cheaper than leather belts and slightly more expensive than cotton ropes.

As these steel belt drives are designed from scientific formula, that accurate information be given to the representatives of the manufacturers of the steel belts is absolutely essential.

The conditions necessary for steel belt transmission is more exacting than those required by ropes or leather belts.

As steel belts may be applied in multiples there is no limit to the possible power to be transmitted.

An Electric Babbitt Heater

The Volta Manufacturing Company, Ltd., Welland, Ont., has developed and placed on the market an electric furnace for melting babbitt and such like metals, which will be known to the trade as the "Ideal Electric Babbitt Heater." This furnace has been in continuous service over a twelve months' period, has been subjected to all sorts of tests and has shown results to the entire satisfaction of the company, who are now putting it on the market. It is a piece of apparatus which will surely attract the attention of machine shops, printing establishments and all concerns who have to use babbitt or lead from time to time. For commercial purposes it is intended that the current used in heating this furnace shall be taken off the lighting current in the plant. No volatilization of metal occurs, as the temperature is such as to eliminate any chance of overheating. Metal may be poured into ladles, or, in the case of large bearings, the pot can be hung from a hook or crane, or other appliance, and carried directly to the job, if so desired. On account of the heavy heat insulation the molten metal will hold its melting temperature for about two hours, which allows ample time for transportation without chilling of the metal. Every precaution has been taken to make this furnace simple and convenient and as near fool-proof as possible. The heating element is of a substantial design and is easily changed. It carries current at a low density and, on account of the fact that it covers a large surface of the pot, the heat is quickly conducted to the metal. In this way high efficiency and long service are maintained.

The Electric Appliance Company, Winnipeg, the only electrical firm to enter the Made-in-Winnipeg Window Dressing competition recently held in Winnipeg, open to any merchant in that city, received "Special Mention." They had a very attractive display, being made up of Burgess batteries, fixtures made by the Garry Manufacturing Co., electric stoves by the Langley Manufacturing Co., Limited, and silk lamp shades by Adams Art Company.

Fused Entrance Switch

The Westinghouse Electric & Manufacturing Company has recently placed on the market a fused entrance switch. This switch is rated at 100 amperes, and 2500 volts, and is made in two and three poles single throw. These switches are principally used by distributing companies at the end of their 2500 volt distributing lines, and at the entrance of the line to the customer's plant. This switch is a maximum in safety first features. All live parts are completely enclosed in pressed steel case and tank. The leads go in through fibre bushings, and the cover is interlocked so that it cannot be opened when the switch is closed. The fuses are entirely cut off from the line when the switch is open. The switch is primarily an oil immersed knife switch with fuses mounted in the top. The contacts are a special self-aligning knife blade type. The moving contacts are carried on a wooden drum. The fuse clips are also self-aligning and are mounted on a heavy wooden base, and are designed to take standard fuses. The switch has a large application on high voltage distribution where safety first features not contained in the ordinary knife switch are desired.

Type F-10 Oil Circuit Breaker

To meet the demand of central stations for a high interrupting capacity breaker of the removable unit type, to replace breakers inadequate to handle the existing interrupting capacity of a station, the Condit Electrical Mfg. Co. has placed on the market the type F-10 oil circuit breaker. The type F-10 oil circuit breaker is very compact, and will go into most any cell formerly occupied by an oil circuit breaker having an interrupting capacity between 1200 and 2000 amperes per phase at 15,000 volts. As the interrupting capacity of the type F-10 oil circuit breaker is 10,000 amperes per phase at 15,000 volts, this allows central stations to increase the interrupting capacity of their equipment from five to eight times. As these breakers are not supported from any cell structure, it is only necessary to install the tracks on the cell floor. No overhead framework is necessary, and in general no change is required in the masonry, bus-bars, or connections to the breaker. This type of construction provides for quick renewal and efficient service at a very low installation cost. Some of the important characteristics of the type F-10 oil circuit breaker are high speed of operation; small space requirements; low cost of installation; large steel expansion chamber; oil tanks $\frac{1}{4}$ inch thick; strong insulator brace which is in turn connected to the frame; and the current carrying members are so related as to withstand the thermal and electro-magnetic stresses encountered in large distributing systems. Type F-10 oil circuit breakers are built in capacities from 500 to 1200 amperes at 15,000 volts, and 500 to 800 amperes at 25,000 volts, single throw, and can be furnished for single and multiple operation. The Northern Electric Co. are the distributors of Condit switching and protective apparatus.

Dayton-Dowd Centrifugal Pumps

The Dayton-Dowd Company, of Quincy, Illinois, have issued Bulletin 244, superseding Bulletin 240, describing and illustrating their centrifugal pumps. The design, testing and general specifications are first outlined, followed by a detailed description of the various sizes, types and characteristics. This is a most interesting booklet for the central station, the engineer, or the contractor who may be interested in installing motor-driven pumps for any purpose.

H. C. Stephenson, of Cochrane, Stephenson & Co., Ltd., left Winnipeg on the 11th of June on an extended business trip to Vancouver, calling on the larger centres enroute. He expects to return to Winnipeg in the early part of July.

The Daylite Clothing Factory

A Fine Example of Increased Production and Improved Working Conditions Due to Better Lighting

In no other industry has electricity played such an important part to increase production and improve working conditions as in the clothing industry. The use of electric pressing irons to replace the old sad iron formerly heated by gas and by coal stove, has been a big advance for the improvement of the working conditions for the presser. The fumes from the gas were very injurious to the health of the presser, and the heat in the summer made this work very undesirable.

In the following illustrations the standard electric tailor's pressing iron has been installed. Each iron outlet is controlled by a Bryant-Perkins surface combination heater control with pilot light, switch and receptacle for attaching the iron. The pilot light is very important to indicate when the current is on or off the iron. The sewing machine tables are all motor driven. The motors are 3 phase 220 volts, 25 cycles, direct connected to the line shaft under the table and mounted on the floor. This eliminates the belts and makes a very compact installation. All motors are controlled by Square "D" enclosed motor starters.

The alternating current motor is very desirable for this work, as it eliminates the fire hazard with the direct current motor. There is no arcing, owing to commutator and brushes not being used with the alternating current motors. There is always a considerable amount of lint and small pieces of cloth around the floor in the clothing factory which makes a serious fire hazard with any arcing or sparking under the table. Each machine table is equipped with two motors, one at each end.

The service for lighting and power in this factory is obtained from two central stations, which gives a continuous service in the case of breakdowns. By the use of a 400 amp., 3 pole unfused, 220 volt, Square "D" enclosed safety switch the service can be transferred to either source instantly. The cutting of cloth in large quantities is readily accomplished by the motor driven knife, as shown in the illustration. This apparatus is a big improvement over the former method of cutting all cloth by hand.

The lighting throughout consists of Benjamin porcelain enamel steel reflectors of the deep cone and R.L.M. types. The

deep cone reflectors were used over all cutting tables mounted 3 ft. 0 in. from the top of the table, and 6 ft. 0 in. centres, using 100 watt Mazda C. bowl frosted lamps. The average intensity on the working plane was approximately 5 foot-candles as measured by the portable foot-candle meter. All reflectors are hung with ½ in. wrought iron pipe directly attached to the reflector, with a Benjamin hanger and shock absorber at the ceiling. A screw hook was provided in the ceiling for hanging the reflector. This hook provided a flexible means by which the location of the units could be relocated without a great deal of difficulty. A 4 ft. reinforced flexible cord was provided between the unit and the outlet to add to the flexibility of the system. The cord was connected to the outlet by the means of a Bryant K.A. outlet box receptacle and pin plug, which fits in the outlet of the box and is secured with a standard ½ in. lock nut. At each outlet a Bryant ceiling pull switch is provided to control every two units. This method of sectional control is very convenient and provided a means of saving current when lights are not required in certain sections of the plant. With the 4 ft. of flexible cord it is possible to move the reflector around the outlet without changing the position of the outlet. If any repairs are necessary the reflector can be disconnected by withdrawing the plug and unhooking the hanger. By using the Bryant receptacles in the outlet boxes no joints are required, all connections being made in the terminals of the receptacles.

The lighting in the finishing departments consists of R.L.M. reflectors mounted 10 ft. from the floor and 10 ft. centres. Using 150 watt R.L.M. Benjamin reflectors, the average intensity was 5 foot-candles as measured with the portable foot-candle meter.

All of the wiring throughout is installed in exposed conduit pipe, as the building is of mill construction. The building is all painted mill white throughout, which increases the reflection and helps the lighting system. This factory is owned by P. Firth Bros. of Hamilton, Ontario, who operate one of the largest custom tailoring businesses in Canada, with branches in all the important cities.

The complete installation was made by Culley & Breay, one of the leading electrical contracting companies of Hamilton, Ontario. It was built to the design of Mr. V. K. Stafford, who also superintended the work. This factory has been in operation now for nearly one year, and the equipment has proven very satisfactory in every way.

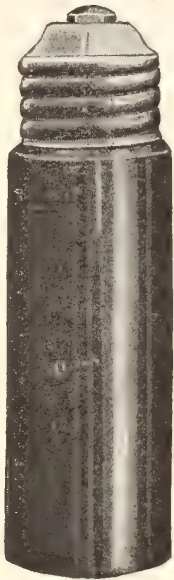


Two Views of a Modern Lighting Installation made by Culley and Breay in the City of Hamilton

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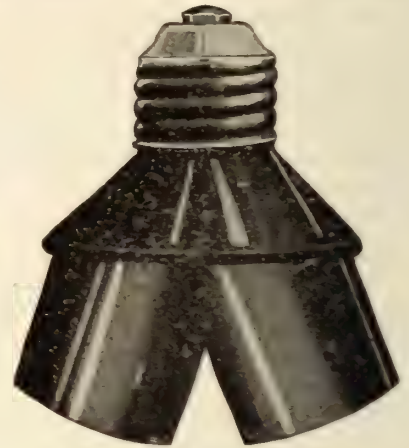
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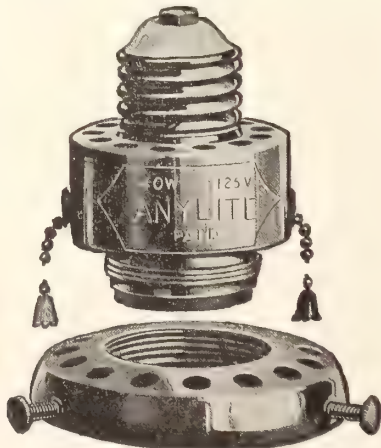
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2-H.P. C.-W.	1800 R.P.M.	\$ 75.00	25-H.P. C.-W.	1800 R.P.M.	\$375.00
3- " C.-W.	1800 " "	90.00	25- " C.-W.	900 " "	425.00
3- " C.-W.	1200 " "	95.00	30- " C.-W.	900 " "	475.00
5- " Wagner	1200 " "	115.00	35- " C.-W.	1800 " "	500.00
7 1/2- " C.-W.	900 " "	225.00	40- " C.-W.	900 " "	600.00
15- " Lincoln	900 " "	300.00	50- " C.-W.	600 " "	850.00
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Position Vacant—Professor of Electrical Engineering in College in Eastern Canada, duties to commence October 1st, 1921. For particulars write Box 50, Halifax, N.S. 14-15

POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, substations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 600, Electrical News, 13 Toronto.

Electrical Superintendent, at present with large milling and mining company, desires change. Has been with present company nine years; first-class references. British Columbia preferred. Box 633, Electrical News, Toronto. 14

An aggressive young boy, fourteen years of age, wishes to learn the electrical trade by serving apprenticeship. Box 635, Electrical News, Toronto. 14

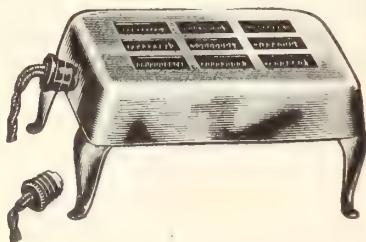
MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	75	3	25	550	480	Westg.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	60	550	970	Westg.
Used	2	50	3	25	550	720	Westg.
New	2	35	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	Tor & Hm.
"	2	30	3	25	550	750	F.-M.
Used	1	25	3	25	550	750	C. G. E.
New	1	25	3	25	550	715	Lanc.
New	1	15	3	25	550	1450	Westg.
"	1	15	3	25	550	750	Lincoln
"	3	15	3	25	550	720	Westg.
New	2	13	3	25	550	700	Lanc.
Used	1	7½	3	25	220	1500	Tor. & Hm.
"	1	7½	3	25	550	1450	C.G.E.
New	1	7½	3	25	550	725	Westg.
Used	1	7½	3	25	550	700	Lanc.
New	1	5	3	25	550	1440	Excelsior
Used	1	5	3	60	200	1120	Westg.
New	3	3	3	25	550	1500	Lanc.
"	4	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
Used	1	2	1	60	110	1500	Wagner
New	2	2	3	25	550	1500	Lanc.
New	2	2	3	25	550	1440	Excelsior
"	2	2	3	25	550	1425	Lanc.
New	1	2	1	25	110	1400	Wagner
"	1	1½	1	25	110	1420	Wagner
New	1	1	1	60	110	1725	Wagner
Used	1	1	3	25	220	1500	Tor & Hm.
Used	1	1	1	25	110	1460	Wagner
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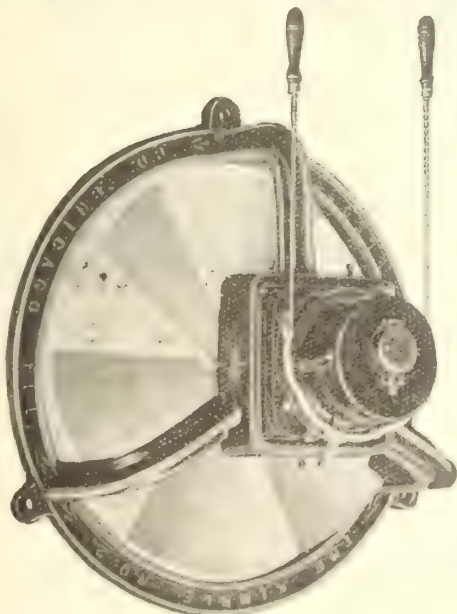
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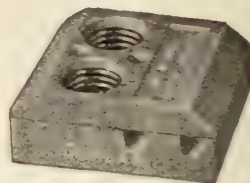
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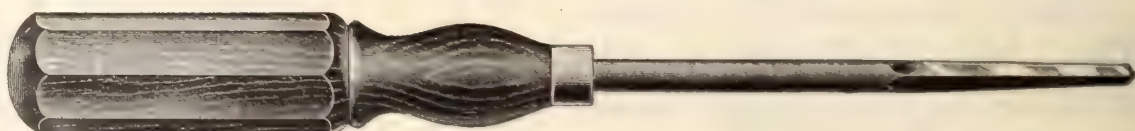
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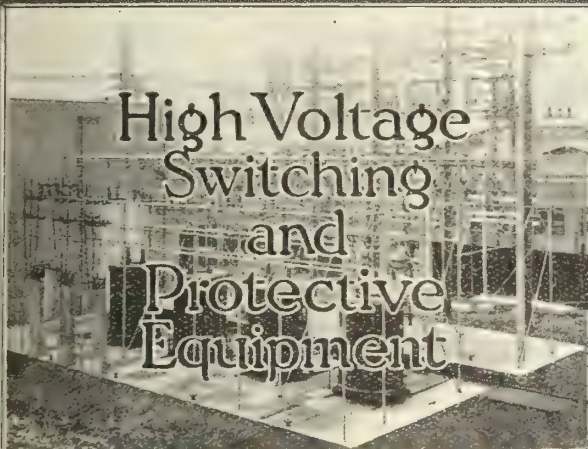
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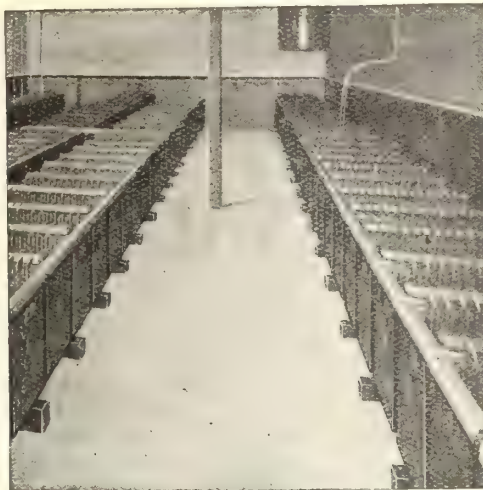
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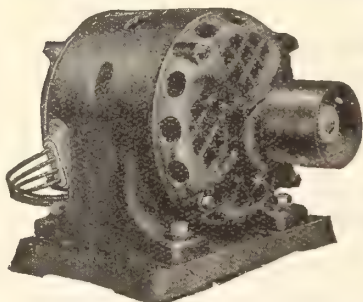
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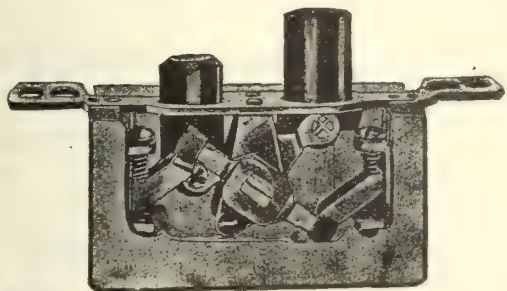
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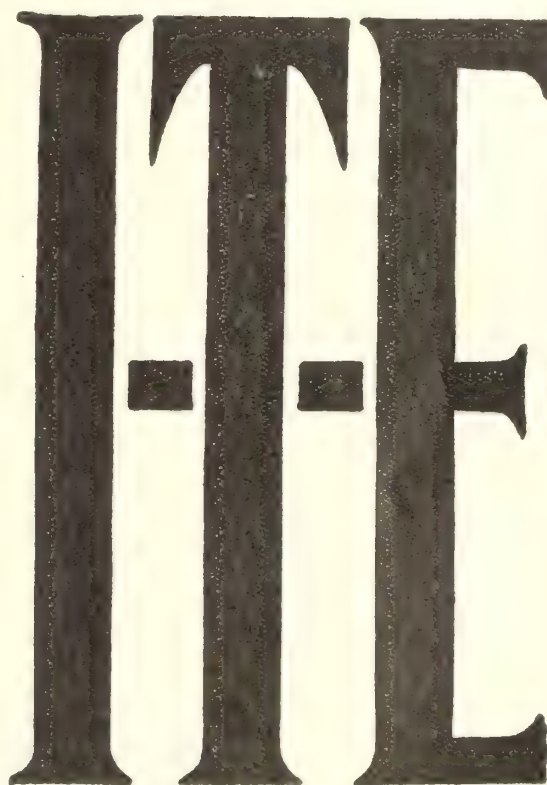
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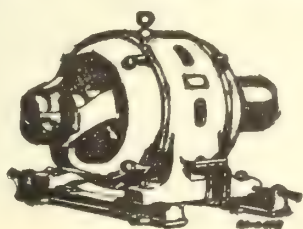
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Spielman Agencies, Registered

AMMETERS & VOLTMETERS

Canadian National Carbon Company
Canadian Westinghouse Company
Ferranti Meter & Transformer Mfg. Co.
Hatheway & Knott, Inc.
Monarch Electric Company
Northern Electric Company
Wagner Electric Mfg. Company of Canada

ARMOURED CABLE

Canadian Triangle Conduit Company

ATTACHMENT PLUGS

Canadian Westinghouse Electric Company
Duncan Electrical Company

AUTOMATIC EXTENSION REELS

Cincinnati Specialty Mfg. Co.

BATTERIES

Canada Dry Cells Ltd.
Canadian Hart Accumulator Company
Canadian National Carbon Company
Electric Storage Battery Co.
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto
Minimax Electric & Mfg. Co.
Northern Electric Company

BOLTS

McGill Manufacturing Company

BONDS (Rail)

Canadian General Electric Company
Ohio Brass Company

BOXES

Canadian Westinghouse Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
International Machinery & Supply Company
Lester, T. W.
National Metal Molding Company

BOXES (Manhole)

Standard Underground Cable Company of Canada, Limited

BRACKETS

National Metal Molding Company
Slater N.

BRUSHES, CARBON

Dominion Carbon Brush Company
Canadian National Carbon Company

BUS BARS

Booth-Coulter Copper & Brass Company

BUS BAR SUPPORTS

Delta Star Electric Company
Moloney Electric Company of Canada
Monarch Electric Company

BUSHINGS

Diamond State Fibre Co. of Canada, Ltd.
Electrical Development & Machine Co.
National Metal Molding Company
Steel City Electric Company

CABLES

Boston Insulated Wire & Cable Company, Ltd.
British Aluminium Company
Canada Wire & Cable Company
Northern Electric Company
Phillips Electrical Works, Eugene F.
Standard Underground Cable Company of Canada, Limited

CABLE ACCESSORIES

Northern Electric Company
Standard Underground Cable Company of Canada, Limited
Steel City Electric Company

CABLE END BELLS

Electrical Development & Machine Co.

CARBON BRUSHES

Calebaugh Self-Lubricating Carbon Co.
Dominion Carbon Brush Company
Canadian National Carbon Company

CARBONS

Canadian National Carbon Company
Canadian Westinghouse Company

CAR EQUIPMENT

Canadian Westinghouse Company
Ohio Brass Company

CENTRIFUGAL PUMPS

Boving Hydraulic & Engineering Company
Canadian Allis-Chalmers Company

CHAIN (Driving)

Jones & Glassco

CHARGING OUTFITS

Canadian Crocker-Wheeler Company
Canadian General Electric Company
Canadian Allis-Chalmers Company
Lincoln Electric Co. of Canada

CHRISTMAS TREE OUTFITS

Northern Electric Company

CIRCUIT BREAKERS

Canadian Westinghouse Company
Cutter Electric & Manufacturing Company
Ferranti Meter & Transformer Mfg. Co.
Monarch Electric Company
Northern Electric Company

CLEAT TYPE SWITCHBOARD INSULATORS

Electrical Development & Machine Co.

CLAMPS, INSULATOR

Electrical Development & Machine Co.

COILS

Cleveland Armature Works

COMUTATORS

Cleveland Armature Works

CONDENSERS

Boving Hydraulic & Engineering Company
Canadian Westinghouse Company
MacGovern & Company

CONDUCTORS

British Aluminium Company
Northern Aluminium Company

CONDUIT (Underground Fibre)

American Fibre Conduit Co.
Canadian Johns-Manville Co.

CONDUITS

Conduits Company
National Conduit Company
Northern Electric Company

CONVERTING MACHINERY

Ferranti Meter & Transformer Mfg. Co.
Lincoln Electric Company of Canada

CONDUIT BOX FITTINGS

Hatheway & Knott, Inc.
Killark Electric Manufacturing Company
Northern Electric Company

CONDULETS

International Machinery & Supply Co.

CONTRACTORS' BORING MACHINES

Canadian Hykon Company

CONTROLLERS

Canadian Crocker-Wheeler Company
Canadian General Electric Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Northern Electric Company

CONNECTORS

Dossert & Company

COOKING DEVICES

Canadian General Electric Company
Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company
Spielman Agencies, Registered

CORDS

Northern Electric Company
Phillips Electrical Works, Eugene F.

CROSS ARMS

Northern Electric Company

CRUDE OIL ENGINES

Boving Hydraulic & Engineering Company

CURLING IRONS

Northern Electric Co. (Chicago)

CUTOUTS

G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
International Machinery & Supply Co.

DETECTORS (Voltage)

G. & W. Electric Specialty Company

DISCONNECTORS

G. & W. Electric Specialty Company

DISCONNECTING SWITCHES

Electrical Development & Machine Co.
Winter Joyner, A. H.

DOORS FOR BUS AND SWITCH COMPARTMENTS

Electrical Development & Machine Co.

DREDGING PUMPS

Boving Hydraulic & Engineering Company

ELECTRICAL ENGINEERS

Gest, Limited, G. M.
See Directory of Engineers

ELECTRIC HEATERS

Canadian Westinghouse Company
Ecuador Mfg. Co.,
McDonald & Willson, Ltd., Toronto
National Electric Heating Company

ELECTRIC SHADES

Jefferson Glass Company

ELECTRIC RANGES

Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company

ELECTRIC RAILWAY EQUIPMENT

Canadian Johns-Manville Co.
Electric Motor & Machinery Co., Ltd.
Northern Electric Company
Ohio Brass Company

ELECTRIC SOLDERING IRONS

Clemens Electrical Corporation

ELECTRIC SWITCH BOXES

Canadian Drill & Electric Box Company
Dominion Electric Box Co.
Solex Co.

ELECTRICAL TESTING

Electrical Testing Laboratories, Inc.

ELEVATOR CONTRACTS

Dominion Carbon Brush Co.

ENGINES

Boving Hydraulic & Engineering Co. of Canada
Canadian Allis-Chalmers Company

FANS

Canadian Westinghouse Company
Century Electric Company
Great West Electric Company
McDonald & Willson
Northern Electric Company
Renfrew Electric Company
Robbins & Myers

FIBRE (Hard)

Canadian Johns-Manville Co.
Diamond State Fibre Co. of Canada, Ltd.

FIBRE (Vulcanized)

Diamond State Fibre Co. of Canada, Ltd.

FIRE ALARM EQUIPMENT

Canadian Hart Accumulator Company
Hatheway & Knott, Inc.
Northern Electric Company
Slater & Barnard

FIXTURES

Duquesne Electric & Mfg. Co.
Edmonds & Company, J. H.
Jefferson Glass Company
McDonald & Willson
Nerlich & Co.
Northern Electric Company
Tallman Brass & Metal Company

FLASHLIGHTS

Canadian National Carbon Company
McDonald & Willson, Ltd.
Northern Electric Company
Spielman Agencies, Registered.

FLEXIBLE CONDUIT

Canadian Triangle Conduit Company
Hatheway & Knott, Inc.
National Metal Molding Company.
Slater, N.

FUSES

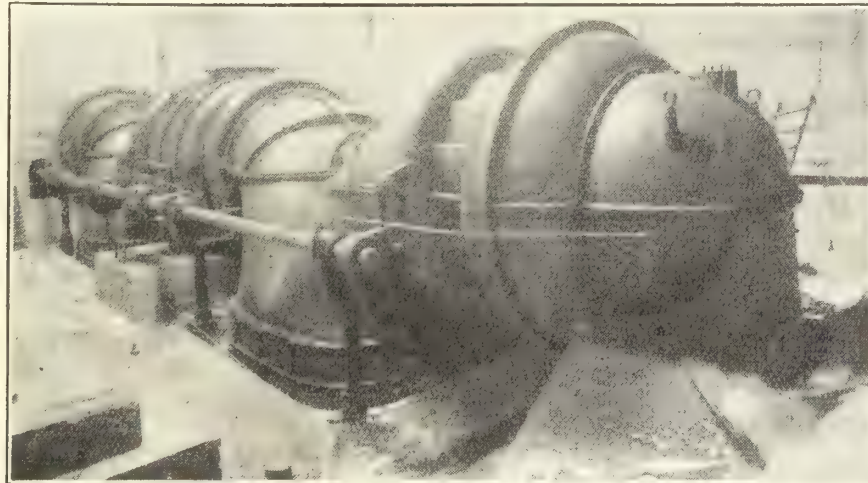
Canadian Johns-Manville Co.
Canadian Westinghouse Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
International Machinery & Supply Company
Moloney Electric Company of Canada
Northern Electric Company

THIS TRADE MARK



IS YOUR GUARANTEE

Made in Canada

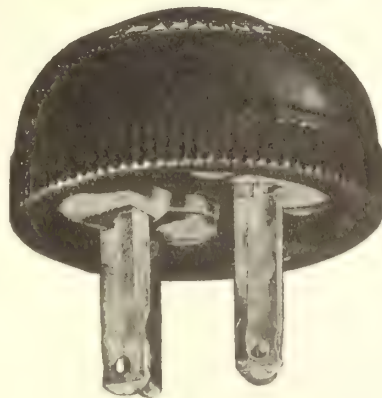
**Water
Turbines****Hydraulic
Governors****Turbo
Pumps****High
Efficiency****Substantial
Construction****Continuous
Service**

The Largest Water Wheel Manufactured in Canada.

BOVING HYDRAULIC & ENGINEERING CO., LIMITED
 LINDSAY - ONTARIO

*International***Multum in Parvo**

Made of Composition Material, Practically Unbreakable. A twist of the fingers makes it fit instant Parallel, Tan-



dem or Right Angled Slots in Attachment Plugs or Receptacles. Being something new and good, of course WE stock it.

*The Paraline Convertible Cap***INTERNATIONAL MACHINERY & SUPPLY CO., LTD.**

421 St. James Street The Electrical House MONTREAL, Que.

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED

FROSTING

Arts Electrical Company

FUSE BOXES

Canadian Drill & Electric Box Co.
Northern Electric Company

GEARS AND PINIONS (Noiseless)

Diamond State Fibre Co. of Canada, Ltd.

GENERATORS

Canadian Crocker-Wheeler Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
Lancashire Dynamo & Motor Company
Lincoln Electric Company of Canada
MacGovern & Company
Northern Electric Company
Thomson Company, Limited
Toronto & Hamilton Electric Company
Wilson-McGovern Limited

GLASSWARE

Consolidated Lamp & Glass Company
Jefferson Glass Company

GROUNDING BOXES

Electrical Development & Machine Co.

GUARDS (Lamp)

International Machinery & Supply Co.
McGill Manufacturing Company

HANGERS (Cable)

Standard Underground Cable Company of Canada, Limited

HEAD GATE HOISTS

Hamilton Company, Wm.
Smith Company, S. Morgan

HEATING DEVICES

Canadian Westinghouse Company
Clemens Electrical Corp. of Canada, Ltd.
Hatheway & Knott, Inc.
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company
Spielman Agencies, Registered

HIGH TENSION EQUIPMENT

Delta Star Electric Company

HYDRAULIC MACHINERY

Boving Hydraulic & Engineering Company

HYDRO EXTRACTORS

Jones & Glassco

ILLUMINATING GLASSWARE

Jefferson Glass Company

INSPECTION ENGINEERS

Allen Inspection Company
Canadian Inspection and Testing Laboratories

INSULATING VARNISHES AND MOULDING COMPOUNDS

Canadian Johns-Manville Company
Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
Spielman Agencies, Registered

INSTRUMENTS

Canadian Westinghouse Company
Hatheway & Knott, Inc.
Northern Electric Company
Sangamo Electric Company of Canada, Ltd.

INSTRUMENT CUTOUT SWITCHES

Electrical Development & Machine Co.

INSTRUMENTS—RECORDING

Northern Electric Company

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Canadian Johns-Manville Company
Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
International Machinery & Supply Co.

INSULATION (Hard Fibre)

Diamond State Fibre Co. of Canada, Ltd.

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Canadian Porcelain Company
Canadian Westinghouse Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Moloney Electric Company of Canada
Mica Company of Canada
Northern Electric Company
Ohio Brass Company

INSULATING CLOTH

Packard Electric Company

INSULATING VARNISHES

Canadian Johns-Manville Co.

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Clemens Electrical Corp. of Canada, Ltd.
National Electric Heating Company
Northern Electric Company

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Canadian National Carbon Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto
Northern Electric Company

LANTERNS (Electric)

Canadian National Carbon Company
Duncan Electrical Company
Spielman Agencies, Registered

LIGHTNING ARRESTORS

Moloney Electric Company of Canada
Northern Electric Company

LIGHTING PLANTS

Dominion Steel Products

LIGHT-REGULATORS

Dominion Battery Company

LINE MATERIAL

Canadian Johns-Manville Co.
Electric Service Supplies Company
Northern Electric Company
Ohio Brass Company
Slater, N.
Steel Company of Canada, Limited
Steel City Electric Company

LIGHTING STANDARDS

Dominion Steel Products
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LOCK AERIAL RINGS

Slater, N.

MAGNETS

Canadian Westinghouse Company

MARBLE

Davis Slate & Mfg. Company

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Leeds Northrup Company
Northern Electric Company

METAL SPINNING

Booth-Coulter Copper & Brass Company
Edmunds & Co., J. H.

METERS

Canadian National Carbon Company
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lincoln Electric Company
Northern Electric Company
Packard Electric Company
Sangamo Electric Company of Canada, Ltd.

MICA

Fillion, S. O.
Kent Brothers
Mica Company of Canada

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Canadian Crocker-Wheeler Company
Canadian National Carbon Company
Canadian Westinghouse Company
Century Electric Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lancashire Dynamo & Motor Company
Lincoln Meter Company
MacGovern & Company
Marchand Electrical Works
McNaughton-McKay Electric Co.
Northern Electric Company
Petrie, Limited, H. W.
Robbins & Myers
Thomson Company, Limited, Fred.
Toronto & Hamilton Electric Company
Wagner Electric Mfg. Company of Canada
Wilson-McGovern Limited

MOTOR AND GENERATOR BRUSHES

Calebaugh Self-Lubricating Carbon Co.
Dominion Carbon Brush Company

MOTOR STARTING SWITCHES

Canadian Drill & Electric Box Company

OUTDOOR SUB-STATIONS

Moloney Electric Company of Canada

OVERHEAD MATERIAL

Northern Electric Company
Ohio Brass Company

PANEL BOARDS

Benjamin Electric Manufacturing Company
Canadian General Electric Company
Canadian Krantz Manufacturing Company
Devoe Electric Switch Company
Northern Electric Company

PAINTS & COMPOUNDS

G. & W. Electric Specialty Company
McGill Manufacturing Company
Spielman Agencies, Registered
Standard Underground Cable Co. of Canada

PHOTOMETRICAL TESTING

Electric Testing Laboratories, Inc.

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Fetherstonhaugh & Hammond
Ridout & Maybee

PINS (Insulator and High Voltage)

Ohio Brass Company
Slater, N.

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Boving Hydraulic & Engineering Company
Hamilton Company, Wm.

PLUGS

Benjamin Electric Manufacturing Company
Hatheway & Knott, Inc.

POLES

Lindsley Brothers Company
Northern Electric Company

POLE LINE HARDWARE

Canadian Johns-Manville Co.
Northern Electric Company
Slater, N.
Steel Company of Canada, Limited

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Canadian Porcelain Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Ohio Brass Company

PORCELAIN BUSHINGS

Electrical Development & Machine Co.

POST TYPE INSULATORS

Electrical Development & Machine Co.

POTHEADS AND SLEEVES

G. & W. Electric Specialty Company
Northern Electric Company
Standard Underground Cable Company of Canada, Limited

POWER PLANT EQUIPMENT

Boving Hydraulic & Engineering Company
Electric Motor & Machinery Co., Ltd.
MacGovern & Company
Wilson-McGovern Limited

PUMPS AND PUMPING MACHINERY

Boving & Company of Canada
Canadian Allis-Chalmers Company

RECEPTACLES

Benjamin Electric Manufacturing Company
Diamond State Fibre Co. of Canada, Ltd.
Monarch Electric Company
Northern Electric Company
Paulding, John I.

RECORDING INSTRUMENTS

Canadian Westinghouse Company

REFLECTORS

Benjamin Electric Mfg. Co.
Pittsburgh Reflector & Illuminating Co.

REMOTE CONTROL SWITCHES

Electrical Maintenance & Repairs Company

REPAIRS

Electrical Maintenance & Repairs Company
Electric Motor & Machinery Co., Ltd.
Marchand Electric Works
Thomson Company, Fred

REVERSE PHASE RELAYS

Electrical Development & Machine Co.

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Canadian Drill & Electric Box Company

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Duncan Electrical Company
Northern Electric Company

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Davis Slate & Mfg. Company
Heddeville Slate Works

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McDonald & Willson, Ltd., Toronto
McGill Mfg. Co.
Northern Electric Company

Has Outlasted 12 Sets of Ordinary Brushes

A big argument in favor of any commodity is its ability to last a long time.

NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

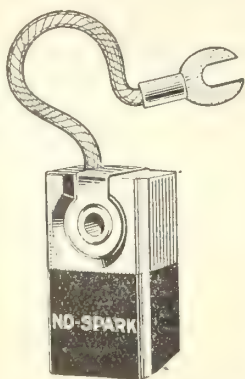
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

Send for our interesting bulletins.

CALEBAUGH Self-Lubricating Carbon Co.

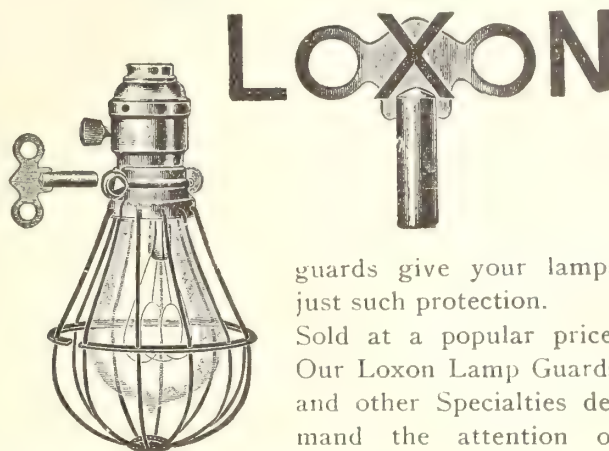
1503 Columbia Ave., PHILADELPHIA, PA.

Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



LAMPS Locked On Can't Get Stolen

They can't get knocked out or broken.



guards give your lamps just such protection.

Sold at a popular price. Our Loxon Lamp Guards and other Specialties demand the attention of

every handler of Electrical Goods

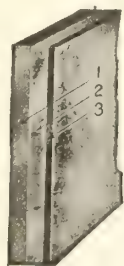
Let us send our list.

McGill Mfg. Co.
Valparaiso - - Indiana

BUY CELESTIALITE NEXT TO DAYLIGHT



No. 5920



Three Layer Glass

- 1 Clear crystal to provide body and strength.
- 2 Translucent white glass to diffuse light evenly.
- 3 Rectifying layer of blue glass to eliminate excess red and yellow rays—producing a soft white light, near daylight.

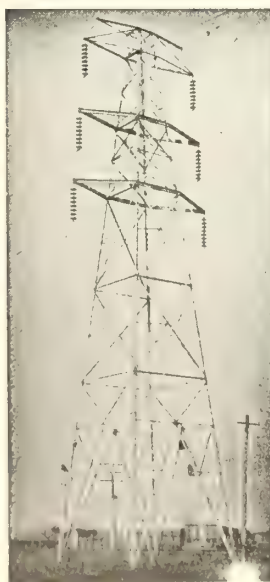
Celestialite Glass produces perfect eye comfort. There is no glare. Colors shown to advantage.

Unexcelled for Schools, Offices, Stores, etc.

Made in many types and sizes.

Tallman Brass & Metal Limited
HAMILTON, ONT.

GALVANIZED STEEL TOWERS AND POLES



The modern means of supporting overhead wires.

**Power
Telephone
and
Trolley
Lines**

We shall be pleased to furnish designs and estimates upon request.

Standard Tower of the Hydro Electric Power Commission of Ontario

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Walkerville, Ontario, Canada
Structural Steel of all Kinds
Montreal Office in New Birks Building.

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED**SPECIAL HEATING APPLIANCES**

National Electric Heating Company
Renfrew Electric Company

STORAGE BATTERIES

Canadian Hart Accumulator Company
Canadian National Carbon Company
Minimax Electric & Mfg. Co.
Northern Electric Company

STREET LIGHTING FIXTURES

Benjamin Electric Manufacturing Company
Northern Electric Company
Winter Joyner, A. H.

SWITCHBOARD SLATE AND MARBLE

Davis Slate & Manufacturing Company

SWITCHES

Benjamin Electric Manufacturing Company
Canadian Drill & Electric Box Company
Canadian Johns-Manville Co.
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Devoe Electric Switch Company
Electrical Maintenance & Repairs Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto.
Moloney Electric Company of Canada
Northern Electric Company
Paulding, John I.

SWITCHBOARDS

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Canadian Westinghouse Company
Devoe Electric Switch Company
Ferranti Meter & Transformer Mfg. Co.
Moloney Electric Company
Monarch Electric Company
Northern Electric Company

SWITCH GEAR

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Monarch Electric Company

TAPE

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Packard Electric Company
Northern Electric Company

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Century Telephone Construction Company
Northern Electric Company

TOASTERS

Canadian Westinghouse Company
Clemens Electrical Corp. of Canada, Ltd.
Egator Manufacturing Company
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company

TOOLS

Northern Electric Company

TOY TRANSFORMERS

Killark Electric Manufacturing Company

TRANSFORMERS

Canadian Crocker-Wheeler Company
Canadian Westinghouse Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
Kuhlman Electric Company
MacGovern & Company
Moloney Electric Company of Canada
Monarch Electric Company
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Packard Electric Company
Standard Transformer Company

TRANSMISSION TOWERS

Canadian Bridge Company

TROLLEY GUARDS

Ohio Brass Company

TUBING

Northern Aluminum Company

TURBINES

Canadian Westinghouse Company
Barber & Sons, Chas.
Boving Company of Canada
Canadian Allis-Chalmers Company
Hamilton Company, Wm.
MacGovern & Company
Smith Company, S. Morgan

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Gest, Limited, G. M.
Northern Electric Company
Standard Underground Cable Co. of Canada, Ltd.

VACUUM CLEANERS

Franke Levasseur & Co.
Hoover Suction Sweeper Co. of Canada, Ltd.
Houston & Company
McDonald & Willson, Ltd., Toronto
Northern Electric Company

VARNISHES

Spielman Agencies, Registered

WASHING MACHINES

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BlueBird Corporation, Ltd.
Connor & Son, J. H.
Henderson Business Machines, Ltd.
Hurley Machine Company
McDonald & Willson
Meyer Bros.
Northern Electric Company
Slade Mfg. Co.

WATER WHEELS

Barber & Sons, Chas.
Smith Company, S. Morgan

WELDING EQUIPMENT

Lincoln Electric Company of Canada

WIRE

Boston Insulated Wire & Cable Company, Ltd.
Canada Wire & Cable Company
International Machinery & Supply Co.
McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited

WIRING DEVICES

Hatheway & Knott, Inc.
Northern Electric Company

WOOD SCREWS

Robertson Mfg. Company, P. I.

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BlueBird Corporation, Limited
Meyer Bros.

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DILECTO

Where Perfect Insulation is Required

Where electrical equipment is made and perfect insulation is of great importance, BAKELITE-DILECTO is extensively used. Its extraordinary dielectric strength, durability and waterproof qualities permit its use in mechanical applications. Write for catalogue of our insulating products.

B-D, V-F and C-B, in sheets, rods, tubes and special shapes

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San Francisco Office, 525 Market St.; Los Angeles Office, 411 S. Main St.; Canadian Office, Cor. King & Yonge Sts., Toronto, Ont.

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DISTRIBUTING JOBBERS

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**ELECTRICAL SUPPLIES
FIXTURES-MACHINERY**

MOST COMPLETE Stock IN CANADA

"You Can Trust Griffiths Products"

For Electrical Machines

The perfect finishing varnish to be used on coils, wires and fittings of all kind is--

"PAKYDERM"

It dries in 30 minutes, with a fine glossy finish; does not peel off nor crack, and remains tough and elastic indefinitely.

Proof against acids, oil, damp, dust, filings, rough usage etc.

Made in BLACK and TRANSPARENT. Used over "ARMACELL" and "OHMALINE" impregnating varnishes.

Costs less than shellac and is vastly superior.

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Toronto, F. T. Groome, Royal Bank Building
Winnipeg, William A. Gould 39 Charlotte Street
Calgary, Western Supply & Equipment Co.
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**PRICES
TO JOBBERS ONLY**

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Can be obtained from

**G. W. AXTELL & COMPANY
OF SARNIA**

Sole distributors for the Dominion of
Canada.

May we place you on our mailing list?

LIGHT INTENSITY

with a minimum of Power

is obtained with the

**Pittsburgh
Show Window
Reflectors**



They will increase the light 400 per cent. to 500 per cent. This has been established by scientific test.

Illustration shows "Pittsburgh" Reflector No. 100 for 100 or 150 Watt Lamp. Dimensions.—Height, 8¾ inches; Width, 8¾ inches. Holder, 2¼ in. Form "O."

It will be to your advantage to learn more about the efficiency of these Reflectors. Write to-day for illustrations of the different types of reflectors for show windows and indirect lighting.

**Pittsburgh Reflector and
Illuminating Co.**

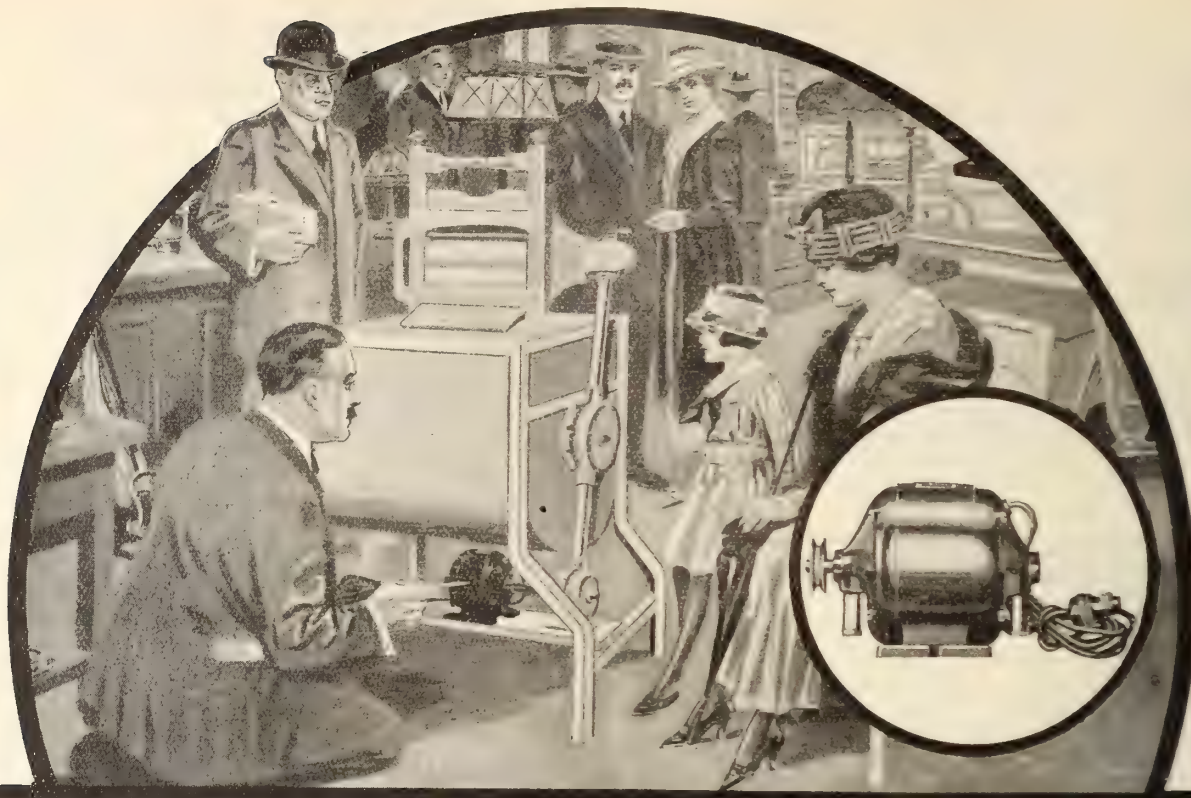
PITTSBURGH, PA.

Canadian Distributors

JAMES DEVONSHIRE, LTD.

701 Yonge Street,

Toronto



Show Her that the Motor is Westinghouse-- The Motor She Knows

When you try to sell a motor driven appliance, the prospect may not be familiar with the appliance itself, but when you point out that the motor is Westinghouse, it means something to her—

National Advertising has been “hammering home” the fact that the Westinghouse Motor is “trouble proof.” *It is “the motor she knows.”*

Then, too, dealers have found that Westinghouse Motor-Driven Appliances invariably need very little servicing—a fact that means permanent sales and permanent profits.

The same quality that is marked in the *Trouble-proof Motor* is part of all Westinghouse Motors. The buffing and grinding motor, and the sew motor are two good over-the-counter Westinghouse sales makers.

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HALIFAX, 105 Hollis St. FT. WILLIAM, Cuthbertson Block.

CALGARY, Canada Life Bldg.

VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg

REPAIR SHOPS

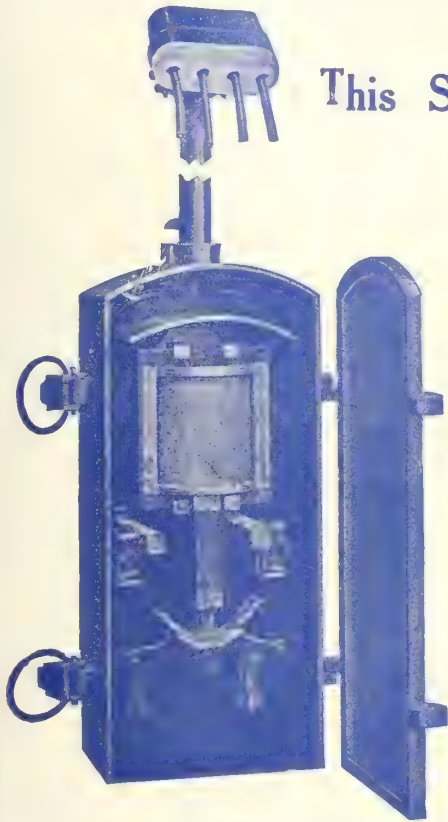
MONTREAL—113 Dagenais St.,
TORONTO—366 Adelaide W.

WINNIPEG—150 Portage Ave., E.
VANCOUVER—1090 Mainland St.

CALGARY—316 3rd Ave., E.



Westinghouse



This **SOLENOID SWITCH** has been adopted
by the Hydro Electric Commission

They use it for

STREET LIGHTING

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

Write for complete descriptive particulars

The **Electrical Maintenance & Repairs**
Company, Limited

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902-903

162 Adelaide Street West
TORONTO

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Made in Canada
Conduit

Electrical Wiring
Made Safe

Approved by the Hydro-Electric Commission of Ontario
Labelled under supervision of Underwriters' Laboratories

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(GALVANIZED)

For All
Electrical
Installations

Manufactured by
National Conduit Co., Limited
Toronto

Sales Agents for Manitoba and Saskatchewan—Filer-Smith Machinery Co., Limited, Winnipeg.

White's Porcelain Trolley Hanger

is more easily installed and more satisfactory in service

The insulator, stud and yoke are separable, yet they assemble as a unit. When the trolley ear is attached and screwed up firmly on the stud, it can be twisted around at right angles to the span wire without loosening the ear on the stud. The head of the stud is countersunk into insulator so it can't turn after the ear is set in proper alignment. The insulator is made of durable glazed porcelain. The yoke is galvanized iron, the stud sherardized steel. White's Porcelain Hanger is extremely durable, safe and low in cost and WE CAN SHIP AT ONCE.

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 PINE STREET, ST. LOUIS, MO.

Our Newspaper Campaign has developed an increased demand for:—



C-6 Range

National ELECTRIC Appliances



A-4 Range

ARE YOU GETTING YOUR SHARE OF THIS BUSINESS?

The National Electric Heating Company

544-548 Queen Street East, TORONTO, Canada

LIMITED

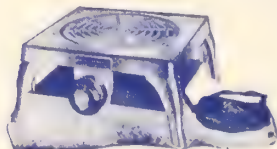
249 Mountain St., Montreal

627 Vancouver Block, Vancouver

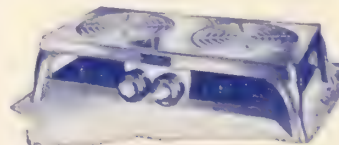
52 Albert St., Winnipeg



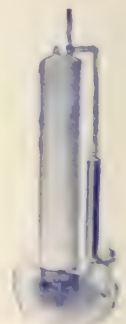
EO5 Range



One Burner Hot Plate



Two Burner Hot Plate



Water Heater

Electrical

News

Engineering
Contracting

Merchandising
Transportation

Northern Electric
QUALITY

When the Northern Electric
stamp an article, that stamp
is as true as the stamp on
the coins of the realm.

*Ask our nearest Branch House
for particulars.*



Northern Electric Company
LIMITED

Montreal
Halifax

Quebec
Ottawa

Toronto
Hamilton

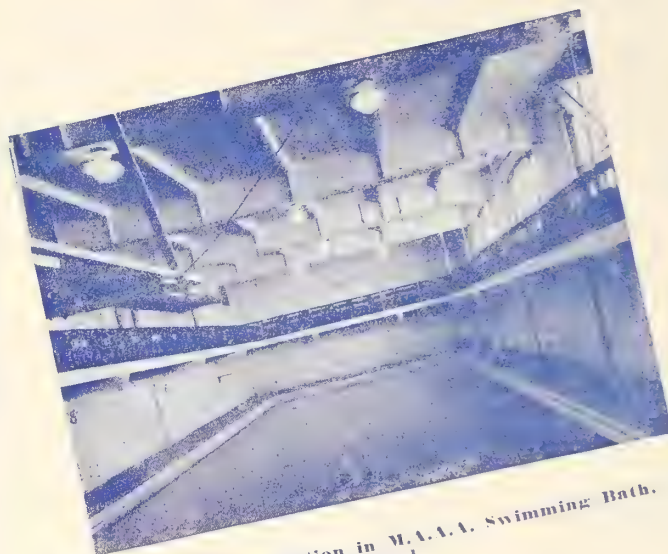
London

Windsor
Winnipeg

Regina
Calgary

Edmonton
Vancouver

For Better Illumination



Four-in-One Installation in M.A.A.A. Swimming Bath,
Montreal



Four-in-One Installation in the offices of Dominion
Caneries Limited, Hamilton, Ont. A. B. Stafford,
Consulting Engineer and Architect, Sun Life
Bldg., Hamilton

These Installations solved two problems of Correct Lighting

Your territory teems with unsolved lighting problems. Many factories, offices, stores, hotels, churches, theatres and other public buildings are victims of defective illumination. New buildings are constantly being erected. Every lighting prospect has its own peculiarities, to meet which a variety of fixtures are designed. It becomes a question of correct application. Let our illumination specialists assist you in deciding the form of lighting best adapted to your clients' needs.

Write our nearest house

Northern Electric Company

LIMITED

Montreal	Quebec	Toronto	London	Regina	Edmonton
Halifax	Ottawa	Hamilton	Windsor	Winnipeg	Vancouver



Condulets



Conduit Fittings



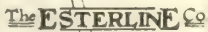
Wiring Devices

Square D
Safety Switches

Flashlights



Lighting Fixtures

Indicating
InstrumentsProtective
Switching ApparatusGraphic
InstrumentsElectric Signal
Apparatus

THE KEY TO SAFETY

Trade-marks Representing Quality Products

IT GIVES us genuine satisfaction to be associated with the companies represented by these well-known trade-marks.

Each trade-mark stands for a quality product of the highest grade that has long since established its worth wherever electrical work is done.

Electrical
ApparatusWiremold &
FittingsSwitchboard &
Protective FittingsControl
Apparatus

Wiring Devices

SUPERIOR
WIRING DEVICES

Northern Electric Company LIMITED

MONTREAL
HALIFAX
QUEBEC

OTTAWA
TORONTO
HAMILTON · LONDON

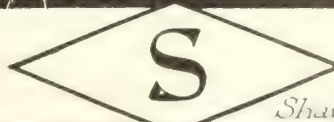
WINDSOR
WINNIPEG
REGINA

CALGARY
EDMONTON
VANCOUVER



Wiring Devices

CANADA



Shawmut Fuses



Jefferson
 "515"

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A Pleasing Deviation From the Ball Globe

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo glass, with standard 6" fitter. Adaptable for any business lighting.

GET ON THE "515" AND CREATE NEW BUSINESS

Ask for Our New Booklet of Commercial Lighting Units

The Jefferson Glass Company, Limited

Head Office and Factory: 388 Carlaw Avenue
 Toronto

Showrooms: 164 Bay St., Toronto
 272 Main St., Winnipeg

285 Beaver Hall Hill, Montreal
 510 Hastings St. W., Vancouver

How quick can you renew a fuse?

*Read how "Noark" easy link renewal
saves time and money*

THE picture shows how easy it is to renew a "Noark Renewable Fuse—but the actual operation is still easier.

"Noark" Fuses do not freeze up

To renew a blown link, simply unscrew the heavily knurled end caps and draw out the blades. The gun metal finish of the caps, washers and threaded ends prevents corrosion or the adherence of any metal that may be fused or vaporized when the link is blown. Pliers are never necessary to unscrew the end caps.

A screw-driver is all you need

to remove the two little screw bolts which hold the renewable link. Insert a new link and replace the cartridge, washers, and end caps. The renewing operation is then complete.

When you buy renewable fuses

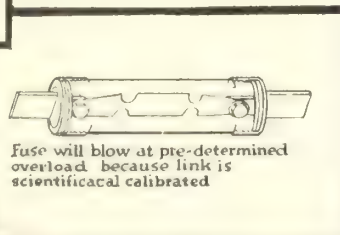
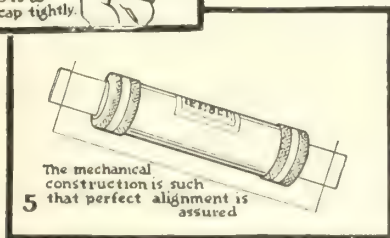
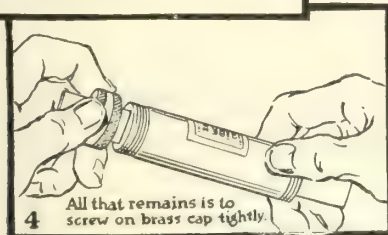
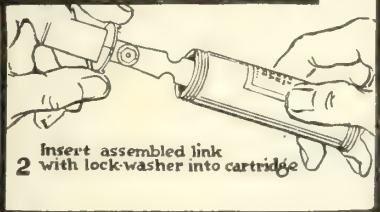
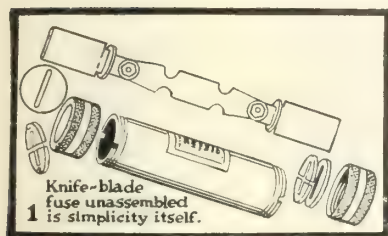
look for the sturdy grey body and the *gun metal* finish of the knurled caps. By these characteristics you can recognize "Noark" Renewable Fuses anywhere. Their individuality is clearly apparent and classifies them as the dependable fuse protection you need.

"Noark" Fuses and all other Johns-Manville packaged Electrical Materials are distributed strictly through Distributor-Dealer channels on a basis that gives full protection to all concerned. Dealers can get all details from their Distributor. Distributors, for samples and complete information, should apply to the nearest Johns-Manville Branch.

"Noark" renewable and non-renewable cartridge-enclosed fuses, in all standard capacities, are approved by the Underwriters' Laboratories, Inc., under the label service.

Canadian Johns-Manville Co., Limited

Toronto Montreal Winnipeg Vancouver
London Hamilton Ottawa



COVERS THE CONTINENT

Through—

Asbestos

and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE ELECTRICAL MATERIALS



You Can Make 40% Profit

THE secret of successful merchandising is quick turnover. To keep our factory working up to top notch, and to boost "Made in Canada" electrical goods, we are inaugurating a merchandising campaign, featuring our celebrated Sovereign Electric Iron.

It's going to be a winner. Thousands of women will be attracted to the electrical stores, that are displaying the

Sovereign Electric Iron

in their windows.

The margin of profit on the Sovereign Iron is particularly generous. The new list price of \$6.00, and the special discounts, enable you to make 40% profit on this appliance.

Specially prepared advertising matter, suitable for your use, with your name and address printed, free of charge, is available. Sales letters printed on attractive dealer letterheads, ready-prepared news-paper advertisements, window cards, folders, etc., are yours for the asking.

Boost "Made in Canada" Electrical Goods

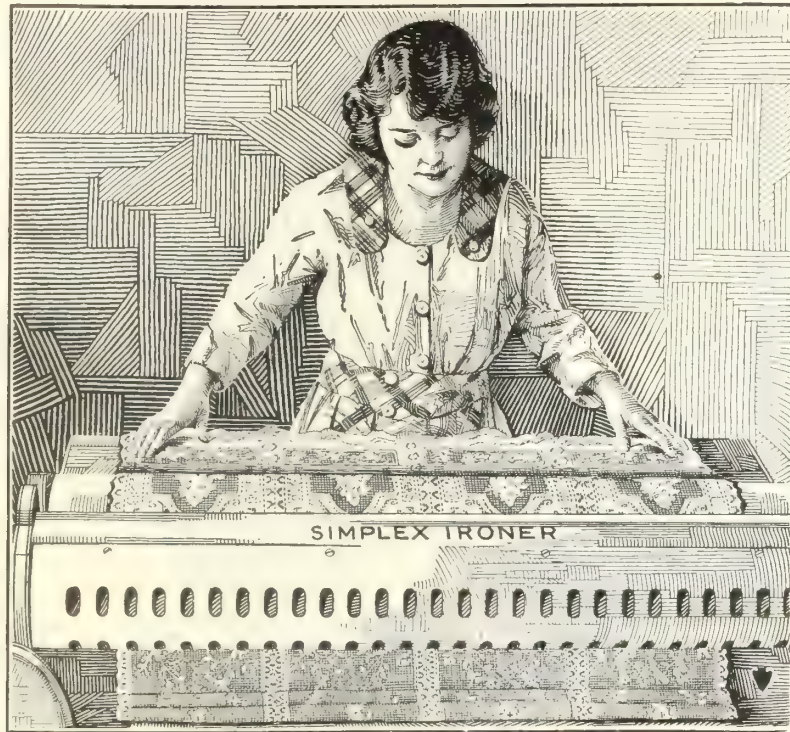
Canadian General Electric Co., Limited

Head Office



TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson, and Victoria.



Saleability

There can be no doubt about the selling possibilities contained in these "Simplex" Ironers.

Their splendid construction and high-grade materials insure a long service. And this, together with the fact that they fill a real need, quickly wins over the busy housewife. In addition we render every possible help to the dealer in the way of window cards, folders and newspaper cuts.

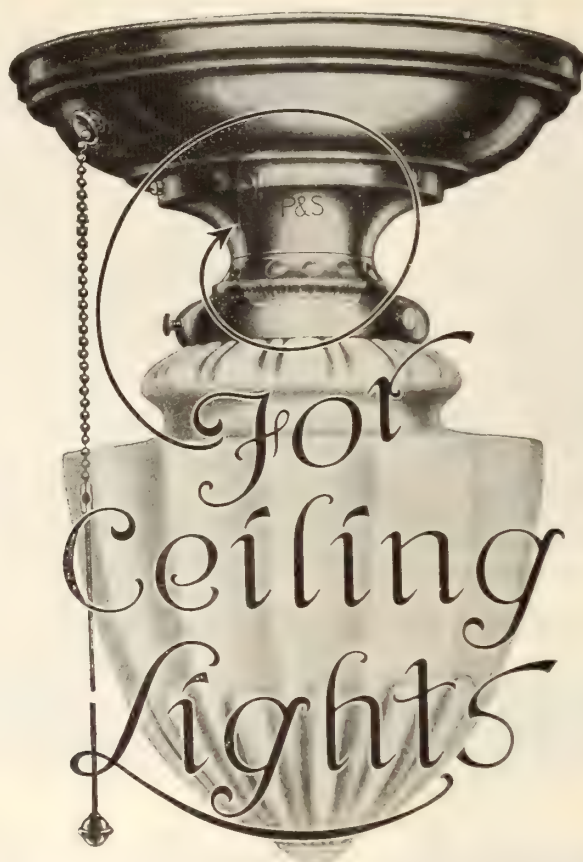
It is an opportunity no electrical merchant should overlook. Write and let us send you full particulars. Prices will appeal to dealer and consumer.

Canadian Ironing Machine Co., Limited
Woodstock Ontario

SIMPLEX IRONER

"THE BEST IRONER"

*The Arrow
Points at the
Receptacle*



*For
Ceiling
Lights*

*Send for a
Sample of
P&S 998
Now*

Let us send you a free Sample
because these Receptacles are selling at this time

Fixture Men and Electrical Contractors
are Buying P&S 998 and 427



P&S 998

Easy to buy
Quick to use
For Quick Sales

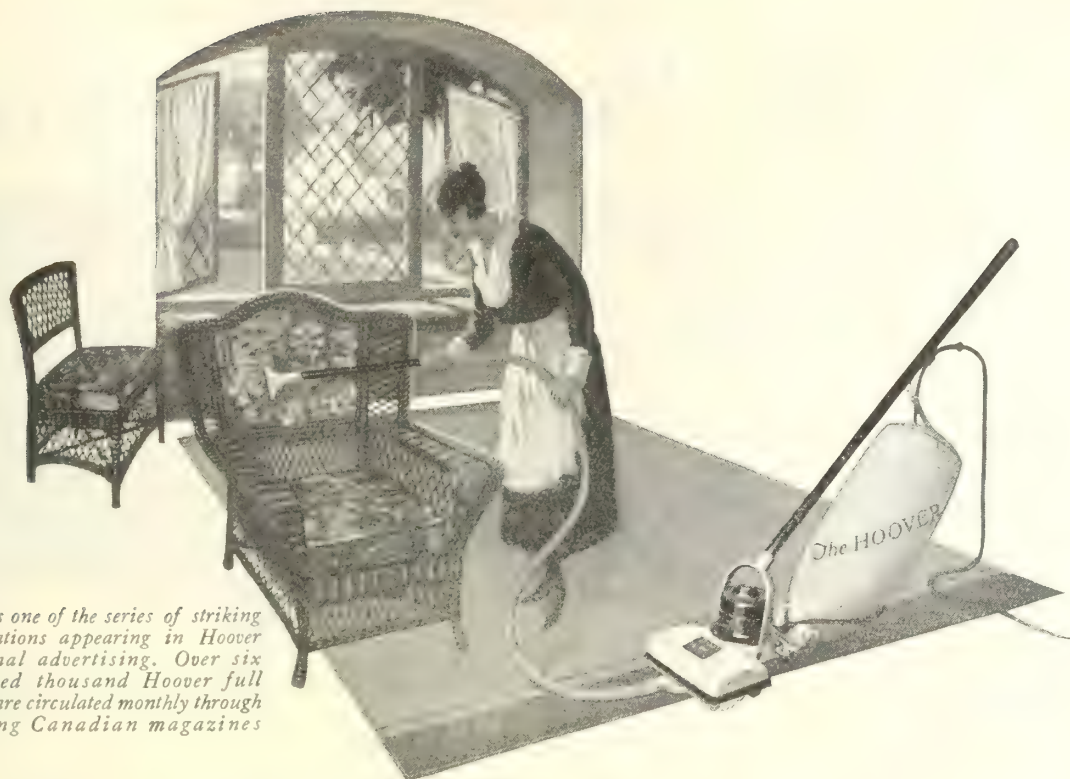
Make a Snappy Bed-room Light
with 998 or 427



P&S 427

*Only a few folders left—
Write today for Ceiling Light Folder*

PASS & SEYMOUR, Inc.
SOLVAY NEW YORK



This is one of the series of striking illustrations appearing in Hoover national advertising. Over six hundred thousand Hoover full pages are circulated monthly through leading Canadian magazines

The Hudson's Bay Company Did a \$22,055 Hoover Business Last Year at Vancouver on the Resale Plan

The opportunities that exist to sell Hoovers in quantity are excellently illustrated by the success of the Hudson's Bay Company at Vancouver with a population of 124,000.

This big department store, as do many other of our dealers, operates on the Hoover Resale Plan—an arrangement under which we secure leads, demonstrate, sell and service Hoovers in co-operation with the store, thereby supplying the dealer with a retail organization trained to get and to care for a large volume of business on Hoovers.

As a result, 289 Hoovers, plus many sets of attachments, were disposed of through this Hudson Bay store in 1920.

Demonstrations were regularly conducted both on their main floor and in the carpet department, while window displays and newspaper advertising were used consistently.

This year their sales will exceed those of 1920.

They find, as all Hoover dealers do, that The Hoover attracts desirable new patronage, as well as cements the relationship with old customers, and therefore it is a valuable asset to any store aside from the direct profits.

The Hoover and the Hoover Resale Plan are gaining every day. Are you willing to consider them now?

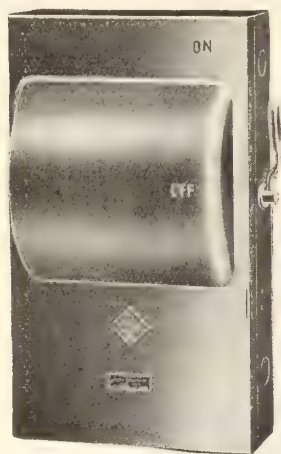
THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and General Offices: Hamilton, Ontario

The HOOVER

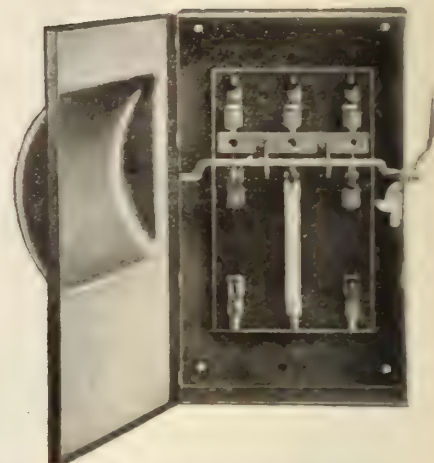
It Beats... as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

Externally Operated Switches



Add Appearance
as well as Safety
to your job by
using



LANGLEY EXTERNALLY OPERATED SWITCHES

Write for Price List

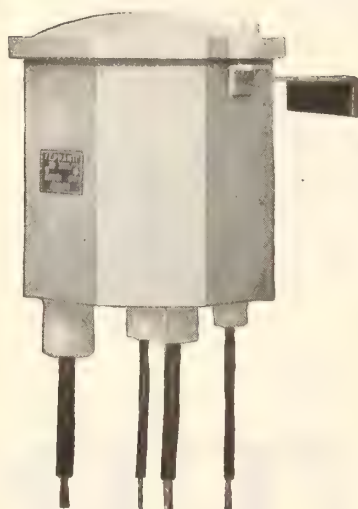
Langley Electric Mfg. Co., Ltd.

WINNIPEG

MANITOBA

FERRANTI

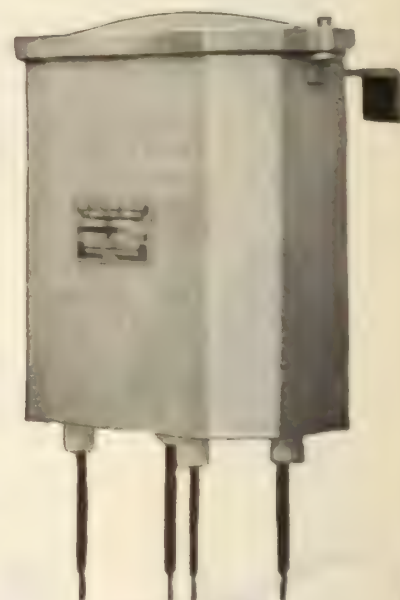
Transformers Current and Potential for Rural Distribution



TYPE "GW"

TYPE "GW" Cross-Arm Mounting. Weatherproof. Circuit up to 4400 volts. Rating 50 Volt Amperes.

TYPE "PW" Potential Transformer, Pole Mounting. Weatherproof. Single or Three Phase for circuits up to 4400 Volts.



TYPE "PW"

Ferranti Meter & Transformer Mfg. Co. Ltd.

20 Noble St.
TORONTO

128 Bleury St.
MONTREAL.

Simpson Bldg.
HALIFAX.

145 Market Ave.
WINNIPEG

Northwestern Engineering & Supply Co.
CALGARY

Northern Ontario
J. P. Bartleman
Timmins



A Galvaduct Building

Warehouse at Turcot, adjacent to Montreal.

Property of the Imperial Tobacco Co.

Electrical Contractors: The MONTREAL ELECTRIC CO., Limited.

Galvaduct Loricated

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

Always specify Galvaduct or Loricated Conduits

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

**If your jobber cannot supply you—
write us**

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

Monarch Porcelain Wiring Devices



Monarch No. 247 Key Wall Socket

MONARCH Porcelain Wiring Devices are all made of first grade porcelain and metal parts.

Their strong and well tried design will give you the most reliable service. The skilled and painstaking labor used in their assembly further protect both seller and user. We shall be glad to explain to you the detailed make-up of any of these devices.

You can get prompt delivery on Monarch Porcelain Material on account of the good stocks maintained.

You will be interested by our prices on these devices. Let us quote you.

SELL MONARCH CANADIAN-MADE MATERIAL

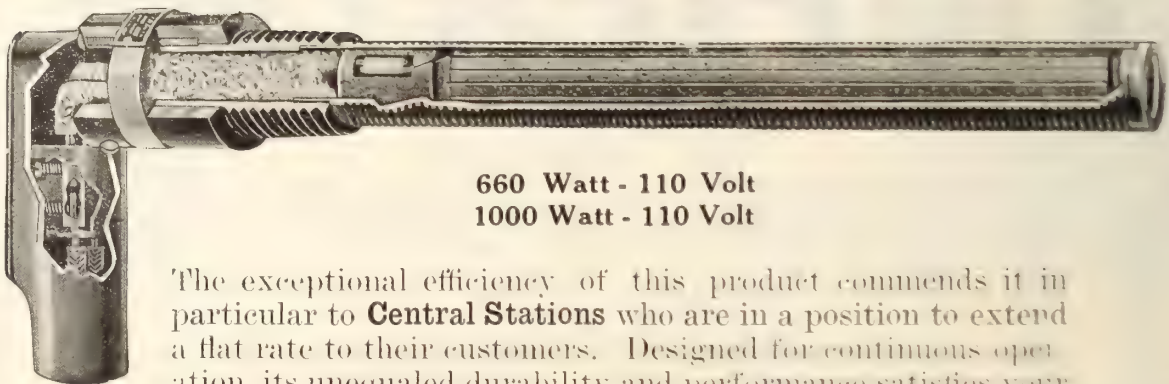
Monarch Electric Company, Ltd.

St. Lambert

District of Montreal

THERMO-ELECTRIC

Water Heating Device



660 Watt - 110 Volt

1000 Watt - 110 Volt

The exceptional efficiency of this product commends it in particular to **Central Stations** who are in a position to extend a flat rate to their customers. Designed for continuous operation, its unequalled durability and performance satisfies your client and secures for you a Domestic Load of an attractive nature. Advise us and we will place for your attention the municipalities who have already taken advantage of the opportunity suggested.

THERMO ELECTRIC LIMITED

Brantford Canada

MADE IN

**BENJAMIN
PRODUCTS**

CANADA

Benjamin Porcelain Key Sockets (C.H. Type)



capacity 660 watts, are especially suitable for use in bathrooms, basements, laundries, or other places where damp is about and it is desirable to guard against possibility of shock from electric current. There are two kinds, namely, all-porcelain pendent as illustrated, and porcelain with brass cap for bracket or fixture use. The push key is easy to operate without jarring the lamp or placing any strain on the cord or fixture, causes of trouble which are avoided where Benjamin Porcelain Key Sockets (C.H. type) are used.

*For further information write to
11-17 Charlotte Street, Toronto.*

**BENJAMIN
PRODUCTS**

The following are divisions of Benjamin products on which we will be glad to send information.

Electrical Wiring Devices and Specialties (including Benjamin Two-way Plug) Industrial Lighting Fixtures and Reflectors, Store and Office Lighting Fixtures, Panel Boards and Cabinets, Sheet Metal Drawings, Stampings and Spinings Factory and Warning Signals.

BENJAMIN ELECTRIC MFG. CO. OF CANADA, LTD. TORONTO

212 McGill Street
MONTREAL

311 CONFEDERATION LIFE BLDG.
WINNIPEG

"BANFIELD"

Push Button Switches

Boxes Plates

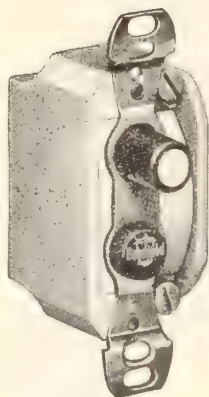
One complete line for switch installation

Single, Double Pole and Three Way Switches.

Plates in any number of gangs, .025, .032 or .040 Brass.

Switch Boxes single gang, two gang, and spacers to make up any number of gangs desired.

No other Canadian manufacturer can offer you this service.



No. 2901 Single Pole



No. 7055 Plate



No. 750 Single Box

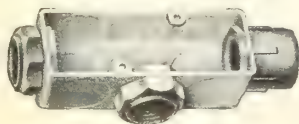
Ask your jobber. He has them.

W. H. Banfield & Sons Limited

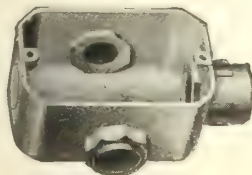
370-386 Pape Avenue

- TORONTO

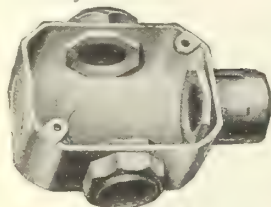
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1410
1/4" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment

"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

Used
From

Universally
Approved

Moloney
*A purely
Canadian made
Product.*



Transformers

*All inquiries
receive prompt
attention.*

Coast
to
Coast

Reliable
and
Efficient

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.

District Offices

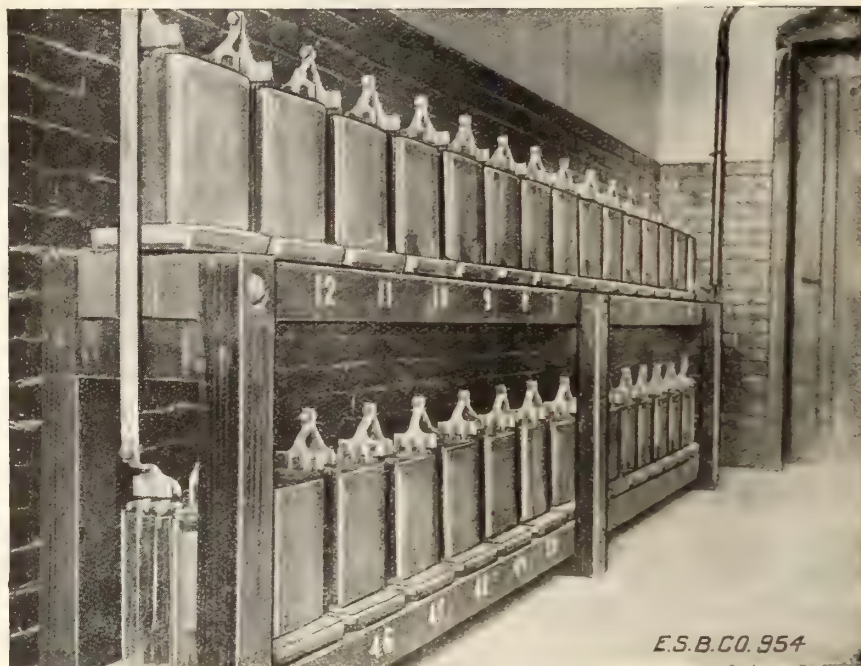
Factory

Head Sales Office

Montreal and Halifax

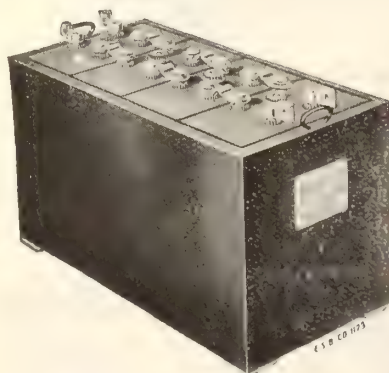
Windsor, Ont.

1221-2 Bank of Hamilton Bldg. Toronto



Exide
MADE IN CANADA
BATTERIES

VITALLY NECESSARY to the Emergency Opera- tion of Oil Switches



Exide Battery type MVS
sealed in Giant jars

**No separate Bat-
tery Room
Required**

The extensive introduction of remote control switching and regulating apparatus in the modern power house has led to the demand for a reliable source of energy for the operation of oil switches, circuit breakers, field rheostats, etc. which shall be entirely independent of the regular circuits, and which may be held in reserve exclusively for this purpose.

Exide Batteries are performing this service with a degree of satisfaction that can only be looked for in an article which represents the specialized product of 33 years of battery building experience.

EXIDE BATTERIES OF CANADA, Limited

153 Dufferin Street, Toronto

Exide Batteries are made in Canada, in England, and in the United States. Into the Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

G. M. Gest, Limited

Contracting Conduit Engineers

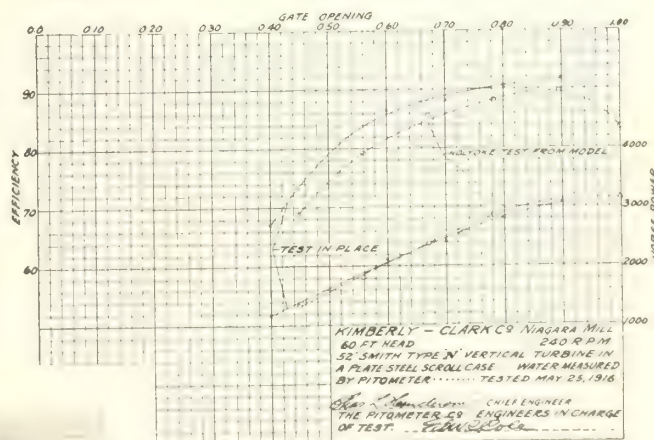
Head Office
Power Building
Montreal

Vancouver

Winnipeg

RESULTS

JUSTIFY
INSTALLING
**SMITH
HYDRAULIC
TURBINES**



The year 1921 has on its
program an immense amount
of

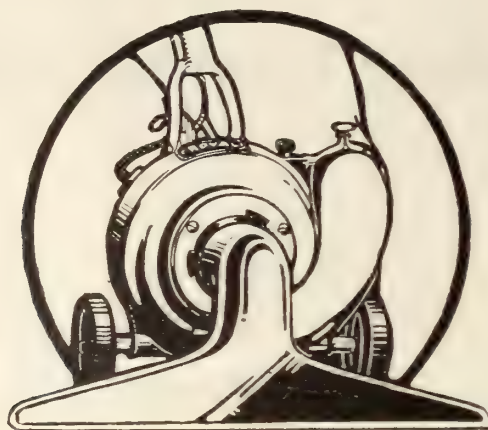
**WATER POWER
DEVELOPMENT.**

If interested, ask for Bulletin "N"

S. Morgan Smith Co.
York, Pa., U. S. A.

H. B. VAN EVERY, Representative
405 Power Building - MONTREAL

A Larger Day's Receipts -- Your Aim



When you put the days receipts into your safe, please pause and calculate how much of that money is for electric cleaner sales -- and how much of the cleaner money is profit. After you've measured your cleaner business by that question, we're very sure you will be interested in knowing about the




"Confidential Merchandising Plans"

... a book which discusses the whole problem of cleaner sales and profits in a common sense business-like-way -- without bluff, brag or bunk; which is the only way to discuss and weigh any business proposition. Dealers who are interested in steady sales and and sure profits -- in a larger day's receipts and a dependable margin -- are invited to investigate the ROYAL Merchandising Plans.

You will find them conservative but effective. They are the sort of tried and true sales methods which not only bring in desirable business but which enhance your prestige and add to your NET profits. And these plans will help you make more money in selling OTHER appliances besides ROYAL Cleaners.

The ROYAL Merchandising Plans are free to responsible merchants.

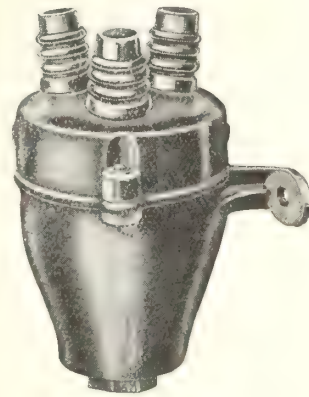
Great West Electric Company Limited
Winnipeg



For Security

**It's Only
a
Small Item**

IN CENTRAL STATION
EQUIPMENT



But—It's a link in the chain.

If your potheads fail a shut-down results—the weak link has broken, and the chain is useless until that weak link is repaired.

Your distributing chain need not be weak—
“FRANKLIN” Potheads, Insulators, Disconnecting
Switches, etc., all have distinctly superior qualities,
and are SAFER.

Write for descriptive literature.

**ELECTRICAL DEVELOPMENT
& MACHINE COMPANY**

PHILADELPHIA
SALES AGENTS

EASTERN STATES
Utility Products Corp.
50 Church Street
New York City

CENTRAL STATES
Midstates Engineering Co.
Westminster Building
Chicago, Ill.

Install the
“FRANKLIN”
and forget it

“FRANKLIN”
GENERATING STATION EQUIPMENT



We built the Motors

and the motor controls for two 150 ton cranes supplied by the Dominion Bridge Company, Limited, Montreal, for the power house of the Hydro Electric Power Commission of Ontario Chippawa development. This covers two sets of motors, four for each crane. Three are on the trolley as illustrated above and the fourth is for the bridge operation. Another tribute to Canadian service, as all our products are designed and built complete in St. Catharines.

Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg,
Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL



Washers
Pulleys
Bushings
Frictions
Handles
Slot Wedges
Parts for starting,
lighting and igni-
tion systems
Protective Papers
Roving Cans
Trucks



Barrels
Receptacles
Useless, Waterproof
Gears
Gaskets
Pinions
Washers
Bobbin Heads
Textile Specialties
Novelties
Sheets, Rods
and Tubes

DIAMOND FIBRE at Toronto Exhibition

We cordially invite every manufacturer attending the Canadian National Exhibition this year to visit our booth in the Industrial Building.

We will be showing Diamond Fibre in all its different forms, both in the raw material and in finished products, as well as articles in which it has been utilized for machined parts in the place of wood, metal, rubber or other materials.

If you are using any of these latter in your manufacturing process it will pay you to let our representatives explain to you how Diamond Fibre can increase your production and decrease your production costs. Our representatives will be at our booth every day and will be glad to answer all enquiries.

We want our out-of-town customers to make the Diamond Fibre Booth their headquarters while in Toronto.

DIAMOND STATE FIBRE COMPANY OF CANADA LIMITED

Head Office and Works :
235 Carlaw Ave.
TORONTO - ONT.

Electrical Books---Special Prices

The following Books are Offered Subject to Previous Sale:

A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published in 1912 by Renouf Publishing Company. 248 pages, illustrated. Price \$1.50.

Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price \$2.50.

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"How to Sell Electrical Labor-Saving Appliances," by Electrical Merchandising, first edition, 115 pages, illustrated. Published in 1918 by McGraw-Hill Book Company, Inc. Price \$1.00.

Practical Electric Illumination, by Terrell Croft. First edition, published in 1917 by the McGraw-Hill Book Co. 225 pages, illustrated. Price \$2.00.

Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price \$4.50.

Principles of Electrical Design—D.C. and A.C. Generators, by Alfred Stull. Published in 1916 by McGraw-Hill Book Co. 365 pages, illustrated. Price \$3.00.

Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price \$2.00.

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"Storage Batteries," by C. J. Hawkes, 157 pages, illustrated. published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.

Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Published in 1917 by Longmans-Greene & Co. 102 pages. Price \$1.00.

Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.

"Theory and Calculation of Transient Electric Phenomena and Oscillations," by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.

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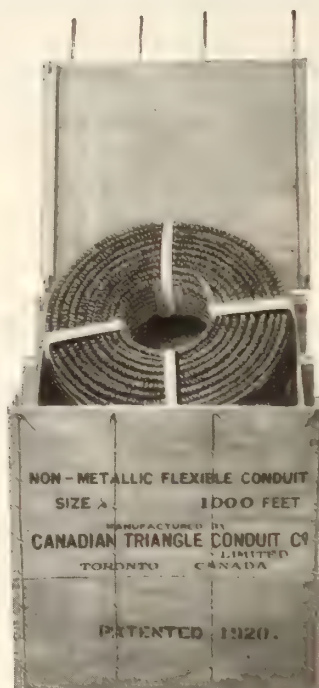
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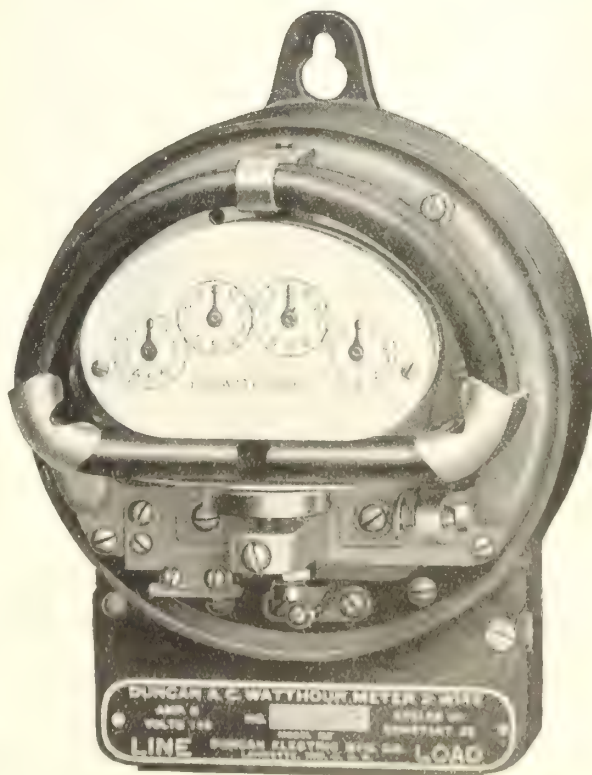
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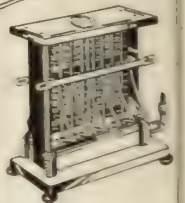
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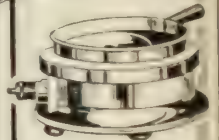
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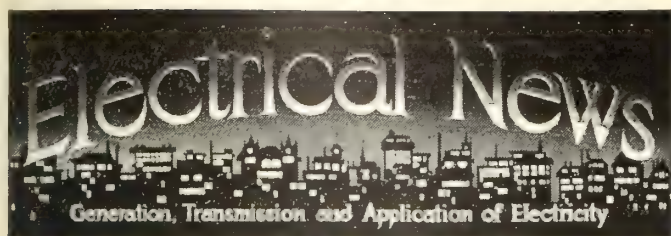
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No. 15

Inactivity in Building Trades is Holding Up Many Other Vital Industries

It is unfortunate that building contractors and their employees could not make some mutually satisfactory arrangement so that the work of construction may be stimulated by cost reductions. Three important conferences have been held in Toronto recently at the first of which Senator Gideon Robertson presided, but the sum total of results is that labor flatly refuses to give way at any point. This in spite of the fact that it was clearly shown that costs of material had dropped considerably and also the cost of living.

Toronto contractors have a yearly signed agreement which, even under the stress of present circumstances they will endeavor to live up to, but when this expires, wages will, undoubtedly, fall. In the meantime, however, construction work will be held up and with it many other industrial activities. Indeed it is difficult to think of any industry that is not adversely affected by the building stagnation.

From the viewpoint of the electrical industry, a deadlock between laborers and building contractors is very much to be deplored. Building work of every kind, both during and after construction, means demand for electrical energy, labor, machinery and equipment of all sorts. The new homes, alone, needed in Canada, would use up the surplus capacity of many of our generating stations, employ our contractors and their employees, create a demand for household equipment, and, incidentally, place orders on the books of our manufacturers and wholesalers enough to make all the

difference between operating profitably and at a loss.

Electricity will also suffer in another way from the unemployment situation. Senator Gideon Robertson recently stated that approximately 17 per cent. of labor is idle, that there was little sign of immediate improvement and that the coming winter would be a very trying period. Unemployment means reduced buying power of everything but the most urgent necessities. Electric light, power and equipment would not be considered in that class by the laboring man. Further than that, and perhaps most important of all, is the fact that the poor man will be inclined to deprive himself of the benefit derived through the use of electricity. Electricity ought to be, and is, the poor man's friend. It is most unfortunate if conditions should separate them more than temporarily.

What part of the present general stagnation is chargeable to high labor costs it is very hard to say. It looks like a logical conclusion however, though it may sound paradoxical, that labor can improve its condition by accepting lower wages.

Shawinigan Falls very Fortunately Situated with Regard to Ice Conditions

By C. R. REID, Electrical Superintendent.

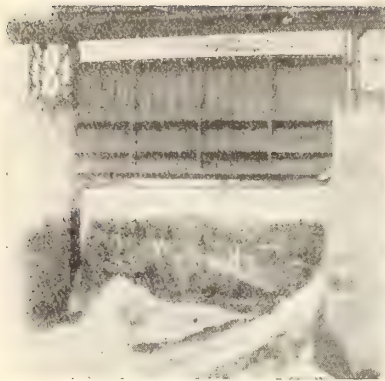
The Shawinigan Falls power development is very fortunately situated in regard to dealing with ice conditions in the river. The considerable expanse of quiet water in the upper bay is held at practically constant level by means of regulating gates, and the ice remains intact until the break-up in the spring. The ice sheet also covers the canal and fore-bay up to within a short distance of the racks. As a result of this protecting ice sheet, the water arrives at the racks free from all frazil or slush even during severe snow storms or other adverse weather conditions.

During the time the ice sheet is forming it is the practice to raise the upper section of the racks about three feet in order to prevent their being clogged with ice. A resistance type thermometer is installed in the forebay with indicator in the system operator's office. Whenever the temperature falls to 32.5 Deg. F., the work of raising the racks is begun.

In the spring after the ice has gone out, the temperature of the water remains close to the freezing point for some time. A cold night with a strong wind will cause the formation of frazil ice with surprising quickness. The only ice trouble experienced in recent years was brought about in this way. Since the installation of the head-race thermometer it is an easy matter to obtain warning of a dangerous drop in the temperature in time to avoid trouble.

The gate houses are heated electrically by means or 2200 volt three phase iron wire heaters. Motor driven blowers deliver the hot air, by means of metal ducts, to the head-gates and racks in order to prevent the adherence of ice.

A similar heating arrangement is provided for two inclosed regulating gates in the main dam. Since there is no spillway, the water level must be controlled by operating the gates. The two regulating gates have each a maximum discharge of approximately 3000 second feet, which is ample for ordinary conditions during the winter months. There are 20 main gates in the dam, each 40 feet long by 18 feet in height. Some views of these gates are shown in the illustration. These views show the ice behind the gates when they are first raised in the spring. During the winter the ice sheet is frozen solidly to the gates, but as soon as the weather turns warm, the heat of the sun, shining on the back of the gates, melts the ice free. As soon as the rivet heads will clear the ice, the gate is raised and the ice immediately above allowed to pass through. During a cold winter



Ice Dam Holding Water Back.



Water Beginning to Break Through.



Lower Ice Dam Completely Given Way.

the ice will form down the face of the gates clear to the bottom. Sometimes when a gate is raised the ice dam will hold the water back for several hours before it gives away.

Trouble has been experienced when the gates were first raised in the spring, due to the ice giving way when the gate was partly raised. The ice forming on the gate is wedge shaped, with the thick end of the wedge at the top where it joins the surface ice. This wedge, if it passes under the partly raised gate, tends to force it upward and throw the hoisting carriage off the track. By raising the gates while the ice is still firm, troubles of this kind are avoided.

Two of the main gates are enclosed on the back with planking and were originally connected by piping with a steam boiler located in the building housing the regulating gates. Whenever it was desired to raise one of the gates during the winter, steam was admitted, and in approximately four hours time the ice was thawed sufficiently to permit of the gate being raised. However, the piping was difficult to maintain in satisfactory condition, as the sudden rise in temperature, when steam was admitted, caused the failure of elbows and other fittings.

A year ago two 5 kw. electric heaters were installed in each of these gates and kept in service throughout the winter. These heaters were sufficient to keep the face of the gates free from ice at all times. Ice formed on the roller trains at the back, but it was not a difficult matter to clear it off when it was desired to raise the gates.

Electric Club of Vancouver Officers for 1921

Accompanying the list of officers of the Vancouver Electric Club for 1921, we are able to reproduce the photographs of Mr. E. E. Walker, who fills the office of president, and of Mr. J. Lightbody, the secretary. Mr. Walker has been particularly energetic in all organizing efforts on the part of the electrical industry in Vancouver and his election to the post of president of the club is a well-deserved mark of appreciation from the members. He is sales engineer for the B. C. Electric Railway Company. Mr. Lightbody is also very active in everything concerning the industry. The list of officers is as follows:

President—E. E. Walker, sales engineer British Columbia Electric Railway Company.

Vice-President—H. Pim, district manager Canadian General Electric Company.

Secretary—J. Lightbody, publicity manager British Columbia Electric Railway Company.

Treasurer—F. W. MacNeill, district sales engineer Canadian General Electric Company.

Directors—H. R. Smith, Smith Robinson & Company; C. K. Dunbar, Northern Electric Company; J. B. Reid, Canadian Westinghouse Company; B. Crann, Crossman Electric Company; J. Churchland, Electric Supply & Contracting Company; W. E. Dawson, British Columbia Electric Railway Company; C. C. Carter, electrical contractor; J. D. Ormsby, Canadian National Carbon Company.



Two Electrical Boosters on the Pacific Coast

On the Left: Edmund E. Walker, President Vancouver Electric Club and Chairman Advisory Council B. C. Electrical Co-operative Association.

On the Right: James Lightbody, Secretary Vancouver Electric Club and Hon. Secretary B. C. Electrical Co-operative Association.



Electrical Standards and their Application to Trade and Commerce

By ORMOND HIGMAN, Director Electricity and Gas Inspection Services and Laboratories, Ottawa.*

In 1892 the Minister of Inland Revenue invited the writer to draft the necessary legislation for the introduction of an electricity inspection service under the general system of weights and measures. For some years previous to this the Canadian gas companies had been making complaints to the department because of the fact that while gas and gas meters were inspected, electricity meters remained uninspected. In taking up the question of the introduction of a system of electricity inspection, obviously the first consideration was that of establishing at headquarters the fundamental units or standards of electrical measure on which the work of testing electric meters and other appliances could alone be based. For how could the Government undertake to question the accuracy of a meter used in the sale of electricity without first being assured that its own testing appliances were accurate?

The solution of the problem of establishing a system of fundamental standards was greatly facilitated at this time by the meeting of an International Electric Congress at the World's Fair, Chicago. The writer was appointed by the Government to represent British North America at the Congress, and as a result of the deliberations of the Congress, a system of electrical units was adopted and a recommendation made that the Governments represented should establish the units in their respective countries by legislative action. Accordingly, during the Parliamentary session of 1893-4 the Electrical Units Act, together with the Electricity Inspection Act, were passed. In order that we may have a comprehensive and progressive record of what has taken place in regard to electrical units the Act embodying the Chicago resolutions follow:

An Act Respecting the Units of Electrical Measure.

1. This Act may be cited as the Electrical Units Act.
2. The units of electrical measure for Canada shall be the following:

Ohm.—(a) As a unit of resistance, the ohm, which is based upon the ohm equal to 10 units of resistance of the centimetre-gramme-second system of electro-magnetic units, and is represented by the resistance offered to an unvarying electric current by a column of mercury, at the temperature of melting ice 14.4521 grammes in mass, of a constant cross-sectional area and of the length of 106.3 centimetres.

Ampere.—(b) As a unit of current, the ampere, which is one-tenth of the unit of current of the centimetre-gramme-second system of electro-magnetic units, and is represented sufficiently well for practical use by the unvarying current which, when passed through a solution of nitrate of silver in water, and in accordance with the specification contained in schedule one to this Act, deposits silver at the rate of 0.001118 of a gramme per second.

Volt.—(c) As a unit of electro-motive force, the volt, which is the electro-motive force that, steadily applied to a conductor whose resistance is one ohm, will produce a current of one ampere, and which is represented sufficiently well for practical use by 1000/1434 of the electro-motive force between the poles or electrodes of the voltaic cell known as Clark's cell, at a temperature of 15° centigrade and prepared in accordance with the specification contained in schedule two of this Act.

Coulomb.—(d) As a unit of quantity, the coulomb, which is the quantity of electricity transferred by a current of one ampere in one second.

Farad.—(e) As a unit of capacity, the farad, which is the capacity of a condenser charged to a potential of one volt by one coulomb.

Joule.—(f) As a unit of work, the joule, which is equal to 10.7 units of work in the centimetre-gramme-second system, and is represented sufficiently well for practical use by the energy expended in one second by one ampere in one ohm.

Watt.—(g) As a unit of power, the watt, which is equal to 10.7 units of power in the centimetre-gramme-second system, and is represented sufficiently well for practical use by the work done at the rate of one joule per second.

Henry.—(h) As the unit of induction, the henry, which is the induction in a circuit when the electro-motive force induced in that circuit is one volt, while the inducing current varies at the rate of one ampere per second.

3. The units of electrical measure described in this Act, or such standard apparatus as is necessary to produce them, shall be deposited in the Department of Inland Revenue and shall form part of the system of standards of measure and weight established by the Weights and Measures Act.

Fifteen years after the action taken at Chicago the British Government (in October, 1908) called a conference in London to further consider the units of electrical measure adopted at Chicago and to revise those units, should it be deemed necessary to do so. Representatives from most of the Governments of Europe and America attended the conference, and as a result of the deliberations of the conference all but the three primary units, the ohm, ampere and volt were deleted from the list and to-day the international units of electrical measure stand as follows:

His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:

1. This Act may be cited as The Electrical Units Act.
2. The units of electrical measure for Canada shall be the following:

Ohm.—(a) As a unit of resistance, the international ohm, which is based upon the ohm equal to 10.7 units of resistance of the centimetre-gramme-second system of electro-magnetic units, and is represented by the resistance offered to an unvarying electric current by a column of mercury at the temperature of melting ice 14.4521



Mr. Ormond Higman

grammes in mass, of a constant cross-sectional area and of the length of 106.300 centimetres arranged in accordance with the specification contained in Schedule A to this Act.

Ampere.—(b) As a unit of current, the international ampere, which is one-tenth of the unit of current of the centimetre-gramme-second system of electro-magnetic units, and is represented by the unvarying current which, when passed through a solution of nitrate of silver in water, and in accordance with the specification contained in Schedule B to this Act, deposits silver at the rate of 0.00111800 of a gramme per second.

Volt.—(c) As a unit of electro-motive force, the international volt, which is the electro-motive-force that steadily applied to a conductor whose resistance is one international ohm, will produce a current of one international ampere. The Weston Normal Cell may be used as a standard of electric pressure, and when set up in accordance with the specification contained in schedule C to this Act, may be taken as having, at a temperature of 20 C., an electro-motive-force of 1.0183 volts.

3. Such standard apparatus as is necessary to produce the units of electrical measure described in this Act, shall be deposited in the Department of Trade and Commerce and shall form part of the system of standards of measure and weight established by the Weights and Measures Act.

4. The Electrical Units Act, chapter fifty-three of the Revised Statutes of Canada, 1906, is hereby repealed.

A comparison of the two Acts will show that apart from the deletions already alluded to, very few changes were made in the three primary units. Two zeros were added to the length of the mercury column of the Ohm and two zeros to the rate of deposition of silver in the determination of the ampere. These zeros are, of course, of no value in respect of the determination of the units, but were added simply to prevent experimenters from adding to or taking from the values arrived at by the Conference. It will also be noticed that the Weston Normal Cell has been substituted for the Clark Cell as a practical standard of electric pressure. The word "international" has also been added to each primary unit.

An effort was made at the Conference to have the volt placed as the second primary unit. One may pick up a piece of wire and find therein an expression of resistance, or a primary cell that will give you an expression of voltage, but no one ever came across anything possessing a residual manifestation of an ampere. A motion was made to give the volt the second place and this was supported by the representatives of the United States, Canada, France, Italy and Japan, but without avail, the motion being defeated by a considerable majority. There can be no doubt, however, that the ampere should be the derived unit and not the volt.

Equipment of Standardizing Laboratories.

We will now revert back to 1894, when the equipment of the standardizing laboratories had to be undertaken. The problem of procuring the necessary apparatus for producing the standards of electrical measure was not so easy at that time as it is to-day. The only standard instruments then available were the electro-static voltmeters and balances invented and manufactured by Lord Kelvin. A number of these instruments, made especially for the department, were procured, covering ranges from 0 to 3000 volts, 0 to 3000 amperes and 0 to 30,000 Kilowatts. To these we were able to add the Clark cell and the Crompton potentiometer with copies of the ohm, shunts and other auxiliary testing appliances.

Continuous current was furnished, of course, by means of accumulators, but the production of alternating currents suitable for standardizing purposes was a matter of some concern. An a.c. generator belted to a d.c. motor operated from storage batteries was tried, but was not of sufficient flexibility in design to afford the necessary range in periodicity and phase angle to meet the requirements of our laboratories. In 1909

the attention of the department was called to a motor-generator set that had been installed in the School of Technology at Manchester, England, and through the courtesy and good work of a British electrical firm our laboratories have been furnished with these machines. So extremely useful have these machines proven to be in our testing work that no apology is made for giving a few details as to their method of construction and operation.

The set comprises two similar alternators direct driven by a continuous current motor arranged between them on the same bed-plate. The motor is a 125-volt interpole variable speed machine of 10 B.H.P., with a speed regulation of 500 to 2000 r.p.m. effected solely by variation of motor-field current. The alternators are 6-pole, 3 phase rotating armature machines, and six slip rings are provided on each so that the armature coils may be connected either star or delta. The larger of the two alternators has a rating of 5 k.v.a. at 25 cycles (500 revs. per minute) and the smaller one 1 k.v.a. at the same speed, and both machines are designed to give 100 volts at this frequency. The larger machine is frequently used in conjunction with a k.v.a. oil cooled transformer giving a normal secondary load of 1000 amperes. The transformer has two primary and two secondary windings. The primary windings can be connected in series or parallel for 200 or 100 volts, respectively, and in the same manner the secondary can be arranged for 10 or 5 volts.

The smaller alternator which is used to supply the pressure circuits, is also used in connection with transformers when the voltage required differs considerably from the normal voltage of the machine. The field system, or stator of this machine, has been turned so as to fit into a circular seating in the bed-plate, and by means of worm-gear may be turned through approximately 180 electrical degrees.

It is quite a simple matter to know if the phase of the voltage of the smaller machine is leading the phase of the current from the larger one or lagging behind it. By rotating the stator against the direction of rotation of the armature, the lead of the voltage is increased, or, by rotating with the direction of the armature the lead of the voltage is diminished, or the lag increased. Moreover, if any doubt exists as to whether the voltage is leading the current or lagging behind it, it is only necessary slightly to alter the position of the stator and to note the effect on an indicating wattmeter. If moving the stator against the rotation of the armature increased the reading on the wattmeter, then the voltage is lagging behind the current and vice versa.

The alternators are excited from secondary cells, and the result is a very steady supply of alternating current.

There is one other piece of testing apparatus with which our laboratories are equipped that may be mentioned, and that is Dr. Drysdale's alternating current potentiometer. By those who have used the apparatus it is regarded as the summum bonum of electrical measuring instruments, and when arranged to work on direct current in addition, in conjunction with a frequency meter and a standard condenser it forms a complete laboratory and will do the work of many other instruments; besides accomplishing it in a more efficient manner and obviating a number of difficult mathematical calculations, so frequent in the case of alternating currents. Alternating voltmeters and ammeters can be calibrated as in continuous current work and with a high degree of accuracy, inductance and capacity tests can be undertaken and dielectric losses determined. Supplied with the potentiometer are two galvanometers, one of the vibration type for a.c. currents and a D'Arsonval galvanometer for direct currents.

Our laboratories are furnished with all the necessary auxiliary apparatus, among which might be mentioned a standard photometer manufactured in London, England, under the direct

supervision of the National Physical Laboratory authorities and furnished with a standard pentane lamp. We have also an Oscillograph for the visual examination of the wave forms of alternating currents at any phase angle or power factor that may be determined upon by means of the alternator or the phase shifting transformer connected with the potentiometer.

Application of Standards to Trade Purposes.

In May, 1895, the Electricity Inspection Act was put into force by proclamation of the Governor-General in Council. It may be stated, parenthetically, that during the Session of 1893-4 the munificent sum of five thousand dollars was voted for the purpose of introducing the inspection service and with which to meet all expenditures connected with it during the year. Instruments had to be purchased, the Gas Inspectors from ocean to ocean had to be instructed how to test electric meters and, lastly, the modest salary of the Chief Engineer had also to be paid out of this vote. It would be unwise to weary the meeting, however, with a desertation of the early struggles experienced in introducing the service, beyond stating that it meant working all day and travelling all night for several years, and in looking back over those early experiences the writer is amazed at, but nevertheless thankful for, the uniform kindness and courtesy extended by the Central Stations of that day.

For the purposes of inspection the Dominion, from the Atlantic to the Pacific, has been divided into 21 districts with a district inspector in charge of each district and having as many assistants as the work of the district may demand. The Dominion has also been divided into three supervisory divisions, each division being in charge of an electrical engineer. In order that the working standards of the inspectors may be taken care of and periodically calibrated two additional standardizing laboratories have been established as branches of the main laboratory at Ottawa. These are located at Winnipeg and Vancouver. The department has been subjected to some criticism because of the creation of these laboratories, but it may be stated their existence is not due to any fanciful or elaborate ideas of a general layout, but to the compelling requirements of the service. Early in our standardizing experience we found that to send a wattmeter or other delicate instrument across the continent from Vancouver to Ottawa for purposes of calibration was utterly futile. The excessive vibration due to carriage by rail for a distance of 3000 miles rendered the instrument practically useless when it arrived back to Vancouver, in so far as any dependability for accuracy is concerned. We tried first to meet the difficulty by sending to Vancouver a laboratory standard wattmeter and voltmeter of the Weston type in order that comparisons might be made on the spot. This, however, did not work satisfactorily, as the Standard instruments in due course required checking, and so we found ourselves at the place from whence we started. It was then decided to establish a fully equipped laboratory at Vancouver to take care of the far West. Later on we found that instruments sent to Vancouver or Ottawa from Winnipeg were also rendered unreliable by vibratory trouble due to long distance travel. After careful observation of the baneful effects of long distance travel on these delicate instruments we were forced to the conclusion that accuracy could not be depended upon if an instrument was expressed beyond a distance of five or six hundred miles. Having reached this conclusion from force of circumstances, a branch laboratory to take care of the Middle West was the inevitable result, hence the branch laboratory at Winnipeg. The working standards of the inspectors are sent in to the nearest laboratory for recalibration not less frequently than once in three months, and oftener if the inspector has the least suspicion that an instrument has become inaccurate.

As an evidence of the growth of the inspection work during

the past quarter of a century it may be stated that for the fiscal year 1896-7 the number of meters tested was:

Electricity	5,762
Gas	16,987
<hr/>	
Total	22,749

For the fiscal year which ended on 31st March, 1921, the number tested was:

Electricity	223,062
Gas	99,319
<hr/>	
Total	322,381

The gas meters are here included in order to show the total amount of work done by the inspection staff. Our inspectors are qualified to test, and do test both kinds of meters interchangeably.

The Standardizing Work of the Laboratories.

With close upon one hundred inspectors at work throughout the country supplied, as they must be, with standard indicating wattmeters, rotating induction meters and voltmeters, in addition to voltage and current transformers, it can be readily understood that to keep these standards in thorough working condition and at all times accurate and fit for service means a good deal of work for the examiners in our laboratories.

The instruments used by our examiners and designed working or secondary standards, are mostly of the Weston indicating type and are constantly being checked up with the primary standards. By means of this frequent comparison and checking we are enabled to maintain the inspectors' standards at an accuracy well within one per cent.

Now, what is desirable and necessary for our own instruments must also be desirable and necessary for the standards used by the Central Stations and the electrical industries generally. Notwithstanding this, the number of instruments received at the laboratories, other than our own, are comparatively few. Are the electrical concerns who use standards for determining the output of their plants and for their guidance generally in electrical measurements content to wander along in the dark and take a chance as to the condition of their instruments, or are they being standardized by unauthorized persons or institutions?

Under the provisions of the British North America Act, Section 91, Subsection 17, the subject of Weights and Measures is definitely and specifically delegated to the Federal authorities. The electrical units and standards already given herein are declared to be a part of the weights and measures system of Canada, which can only be administered by those designated by the Parliament of Canada. Penalties are provided in the Inspection Act against persons other than the authorized inspectors, "who verifies or stamps or causes to be verified or stamped, or who issues a certificate as to the accuracy of any meter," and "meter" is defined as including "every kind of machine, apparatus or instrument used for measuring electrical energy or pressure."

These citations are made not for the purpose of threatening the users of such instruments, nor to induce them unduly to use the laboratories provided under the law, but mainly to fulfil a duty long neglected and for which the department is to some extent responsible. A better understanding and closer co-operation should exist between the electrical companies and the department and our purpose in accepting the invitation to be present here to-day is that some progress might be made along the lines of fraternal co-operation.

It would seem to be desirable that a little propaganda work should be undertaken by the inspection service to overcome the deprecatory whisperings that have gone abroad with respect to the work of the laboratories and the inspection. As an instance of the ignorance that exists with regard to the

work that we are doing, permission might be granted to quote from the evidence of a Professor in one of our Universities given before the Parliamentary Committee on the need of a Research Institute for Canada. He said:

"I should like to appeal for a Bureau of Standards founded on a modest scale to keep pace with the needs of the country. At present, if I wish a thermometer calibrated or a set of weights standardized, or some electrical instrument tested, I must send them to Washington. That should not be. We should have a place here in Ottawa where such instruments could be sent and taken care of at once."

This gentleman did not know, as he should have known, that the Government of Canada shortly after Confederation, fifty years ago, established a system of weights and measures and deposited at Ottawa three copies of the absolute standards of length, mass and capacity, and that a laboratory with the necessary equipment for making comparisons with these standards, down through the years since that time, has been in

operation and that the system has been applied to trade and commerce throughout the Dominion since its first inception.

The same is true with regard to electricity since 1894. We can calibrate this gentleman's thermometer and check his electrical instruments just as well as they can do it at Washington and with this advantage, that the certificate we would furnish him would be valid and legal, while that obtained from Washington could not be so regarded. In fact, such a certificate obtained from a foreign country would have no validity in a Canadian court of law.

Under the circumstances, therefore, we would appeal to the Canadian Electrical Association and the electrical industries of Canada to help us in making known the truth about the matter; and finally to assure them that we have a Bureau of Standards in fact, if not in name, and that we can undertake to calibrate and standardize their instruments satisfactorily and at charges that are merely nominal.

The Most Valuable Part of a Merchant's Store is his Window Display

An appeal to the eye is the most Direct and Effective Method of Arousing Interest in Merchandise. Make your Window pay your Rent.

By A. S. EDGAR, Manager Appliance Department, Canadian General Electric Company *

Without the shadow of a doubt, the most valuable part of a retail merchant's store is his display windows. The percentage of sales made from the sidewalk is surprising.

We sometimes fail to realize that many people never see any other part of our place of business but the outside. Many of them are possible customers. What kind of an impression are we giving these possible customers?

Many times business is attracted to a store, but the appearance of the windows, store front and goods displayed fail to confirm, or bear out, the favorable impression that the other publicity has made.

An appeal to the eye is the most direct and effective method of arousing interest in merchandise. Practically every article must first appeal to the eye. A good window display owes its effectiveness to this first principle of selling.

To display merchandise is not merely to scatter articles about in a half-hearted way, but to show them, as if you were talking to a customer. Merchandise displays, even of the plain everyday kind, demand thought in order to get the right idea before the eye of the prospective buyer.

Often you pass windows that, though they may have been changed the same day, look precisely the same as before. They soon cease to attract the eye. The sameness of display makes them dull and uninteresting.

Suppose John Smith, electrical dealer, dresses his windows on Monday morning in the accepted fashion by filling it with a dozen different articles, ranging from fixtures to heating goods. The next Monday he enters the window, cleans the inside and polishes the glass, and carefully puts back another general assortment of electrical goods that have no relation to each other. The result is that Mrs. Jones, who passes his store two or three times a week, probably notices that John Smith is an electrical dealer, but doesn't notice any change in his window displays—for the simple reason that they are so much alike—that he might just as well have left it alone.

But on the other hand, suppose that this week John Smith, electrical dealer, dresses his windows with nothing but fans.

and uses the display matter the manufacturer is only too anxious to supply him with.

Now when Mrs. Jones is going home, feeling all in from the heat, she passes John Smith's store and cannot help but carry a single idea away with her, namely, that an electric fan will keep her kitchen or dining room cool. And this thought will stay in her mind every time her family grumbles about the heat. She will instinctively think of John Smith's electrical store when she thinks of fans. But, if the window display merely contained a fan among an assortment of a dozen or so other electrical articles, the chances are that Mrs. Jones would never have noticed it.

The most effective window display is that which exhibits the single idea. It drives home a single thought, which not only attracts quickly but is retained more easily. The spectator gets the single impression and, when he passes, a mental picture goes with him. A single impression is more easily made than a series of impressions. Furthermore, the point I would like specially to emphasize is that with the single idea display changes can be made more often, with the contrast so strong that the change itself attracts attention.

All window displays should be changed often. They should never be allowed to get stale, and to this the single idea adapts itself admirably. A dollar or two spent on display matter has been the means of turning a mediocre window into an attractive sales producer.

It is time well spent to figure out the cost of your windows per year. Do it. Charge everything you can think of and you will find that you are spending on that valuable window space considerably less than on a cheap clerk, and yet a mere window can sell for you many times over what a clerk in your employ can turn in.

The display work in every retail store should be placed in charge of some one who has the aptitude for that kind of work. He should be allowed wide latitude to work out his ideas, and be given sufficient time to put in the displays during pay hours.

The small dealer, or a dealer in a small town is, of course, handicapped in making the best use of his windows because

*Before Association Municipal Electrical Utilities.

he cannot afford to hire a regular display man. Any merchant can, however, have attractive displays if he will allow one of his clerks to spend some time and a little money in making them. The time and thought given to this work is much more important than the expenditure of money, as excellent settings can be made with very little cost. It has been estimated that from thirty to fifty per cent. of store sales are made from the sidewalk, through the medium of good window display, before the patron enters the store.

No merchandise lends itself better to attractive showing than electrical goods, but common-sense must be used in order to make your windows produce sales. For instance, the construction of the window, in a great many instances, does not receive the care and forethought it deserves.

A far too large a percentage of windows are built with the background so low that employees can look over at the people on the sidewalk. This may seem a little thing, but it is of very great importance.

A lady steps in front of an electrical store to examine a washing machine, which is working away in the window. She glances up and sees one or more people looking at it from the inside of the store; she naturally moves on, when she probably would have stayed a few minutes longer, and the good features of the washing machine would have had that much longer to make an impression on her mind.

Window backgrounds should not be transparent. They may be constructed of frosted glass, but this tends to distract by interior lighting showing through. Background serves to make a display stand out, and gives an opportunity to properly illuminate the window, because the full light effect is concentrated on the goods showing. There is no necessity to use mahogany or other expensive wood for the background. In many cases composition board will do very well.

The floor of the window is deserving of much thought and care, for it will do much to enhance or detract from the appearance of the merchandise shown. A polished floor is the best for all purposes. It is easy to keep clean and with care will look well for years.

In the rear portion of every window electric base receptacles should be inserted in the floor to provide connections for the various appliances that are to be shown in operation.

Don't deceive yourselves by failing to realize the number of people who can see your windows at night. During the day the passer-by may not have time to give your window more than a passing glance. At night only the "bright spots" are of interest and he has more time and will study your display much more critically. People, who the night before were window shopping, will often be found in the store next morning, willing to talk business.

Very few display men realize what an important part color surface plays in window displays. Sometimes the window will appear bright, and the goods displayed are emphasized with excellent effect, while again, with the same number of lamps in use, the entire display has a full interesting tone.

This is due to the window finish, and the color of the goods on display. The following architect's table, which indicates percentage of light reflected by different color surfaces, is interesting:

Dark blue reflects 6½% of the light falling on it. Dark green, about 10%. Pale red, a little more than 16%. Dark yellow, 20%. Pale blue, 30%. Pale yellow, 40%. Pale green, 46½%. Pale orange, 55%. Pale white, 70%.

It requires higher intensity to light a window finished in dark wood, such as mahogany, than it does one finished in light oak. Articles, in which dark colors predominate, require more light than those with a bright finish.

Some dealers have difficulty in preventing their show win-

dows from sweating or frosting in cold weather. When this occurs the windows are rendered practically useless for publicity purposes, at a time when they are of the most value.

The reason for this is an unequal temperature on opposite sides of the glass. Unless controlled, the temperature of the show windows will be nearly that of the heated store, and, therefore, much higher than the air outside the glass. Warm air carries a much greater portion of water than cold air. Therefore, when the temperature is much greater inside the windows than outside, the warm air comes in contact with the cold glass and the moisture it carries will be deposited, and freeze to the inside surface of the glass. There will also be a similar result on the outside of the glass, if the temperature inside the window is artificially lowered very many degrees below the warm temperature of the air outside. If they correspond within a few degrees there will be no sweating or frosting.

Many of the modern show window frames are constructed with a patent ventilating mechanism that allows the circulation of the outside air to pass across the inner surface of the glass. This method is, without question, the best ventilating system. In order to make this method effective, it is necessary for the window to be entirely shut off from the heat inside the store, and ventilated only from the outside.

In using this method, care should be taken that the outside air is only admitted through a filter, something like fine cloth, or there will be a constant source of annoyance from dust and dirt blowing in from the outside.

The object of displays in show windows is to create sales. It is not enough to interest people in the goods or appliances. Interest must be developed into the desire to buy and the sale practically closed. The endeavor of the dealer in displaying merchandise should be to carry it through with more than merely attracting favorable comment.

Descriptive show cards are the final finishing touch by which the window can be made to actually sell the goods. The salesman frequently needs only to take the money and wrap up the purchase. His show windows have made the sale. This cannot happen if descriptive cards are not used and his customer's questions must otherwise be answered by the salesman. The card that tells the right story and uses the right kind of selling talk, is like the right kind of salesman. All the good points that apply to good salesmanship apply to cards as well. Likewise all the bad ones. The right kind of window card is an indispensable help to any window display.

Cards telling of the various uses and convenience of devices, and with the price plainly marked, are sure to create sales. The first question which enters the minds of most people is, "How much does it cost?"

If the price is not marked the general inference is that the article is expensive—that the dealer is afraid to feature the price. This is particularly true with reference to electrical goods. The prevailing idea of many people generally is that anything electrical is high priced, and that it costs a lot of money to operate.

This idea can be overcome by a show card telling purchase price and approximate cost of operating. Why should these facts be concealed? At some time during the sales these matters must be brought up, and, if the person is informed before entering the store, the salesman can feel that he is a mighty live prospect, rather than one whose curiosity has been aroused.

A good window display is a silent salesman. It attracts attention, arouses the desire to buy, and pulls customers into your stores.

Your windows can be made to pay your rent. They will, if you devote a little time and attention to them.



When the Winnipeg Electrical Fraternity plan a Picnic, it turns out to be the Real Thing. Just think of the Salubrious Effect of a picnic.

Manitoba Electrical Association Holds Big Annual Outing at Selkirk Park

All the delights of an old-fashioned picnic with some new attractions as well were enjoyed by about 500 people who attended the annual picnic of the Manitoba Electrical Ass'n, held at Selkirk Park, on Thursday, July 7th. The affair proved a great success in every way possible, the weather being ideal.

About 150 orphans of the Children's Aid Society and the Khaki Club were the guests of the association, and the officials in charge put forth every effort to make the day one long to be remembered by them. Special cars left Winnipeg at 10.00 a.m. to carry the holiday-makers to Selkirk Park, a distance of 18 miles from Winnipeg. Splendid transportation service was given by the Winnipeg Electric Railway Co. An excellent program of sports was enjoyed, with keen rivalry and good spirit by both old and young. The ladies' balloon race, the three-legged race, the egg and spoon, and the soap scrambles especially provided a great deal of fun. There was a splendid assortment of prizes for the winners and each child, whether a contestant or not, received several balloons and whistles, the latter being donated by A. M. Dobbs of the Canada Dry Cells, Ltd., Winnipeg. The picnickers "pooled" all the baskets, and the whole company gathered around long tables for a real old-time picnic luncheon. Ice cream, candy and fruit were provided free to the children.

The morning and afternoon were taken up with races and baseball. During the afternoon the Khaki Club and Children's Aid were contestants in a baseball game for a sack of flour, kindly donated by the Western Canada Flour Mills Co., Ltd., the Children's Aid being the fortunate winners.

After a very enjoyable supper, the Entertainment Committee played a baseball game against a team picked by Morris Deering, president of the association, it being agreed that the losers pay for a 100-lb. sack of flour, to be donated to the Children's Home. The president's team had the pleasure of donating the gift, as they lost, 11 to 4.

Dancing took place in the pavilion from 8 p.m. to 10.30 p.m., there being a good orchestra in attendance.

The Entertainment Committee, who worked hard for several weeks arranging everything to make the picnic a success, are to be congratulated upon their excellent work. Several members of the committee are deserving of special mention: Fred Pratt, purchasing agent of the Winnipeg Electric Railway Co., chairman of the entertainment committee, is entitled to the highest praise. He worked like a "Trojan" for three

weeks prior to the picnic, and on the day itself he threw aside all pleasures for himself and simply worked for others; but Fred was always known as a worker, when it comes to anything in connection with good, clean sport. He was the recipient of letters from the officials of the Orphans' Home, stating that the orphans had been the guests of nearly all the associations in Winnipeg, but they had the best time of their lives at the Manitoba Electrical Association picnic.

Art McFadyen, western representative of the Standard Underground Cable Co. of Canada, Ltd., secretary of the entertainment committee, was another deserving of praise. Like Fred Pratt, he was here, there, and everywhere, and was instrumental in making the day one long to be remembered.

F. C. Robarts, assistant manager of the Great West Electric Co., Ltd., Winnipeg, was in charge of transportation, and was responsible for the large sale of tickets. It is men of this type that make an association.

The entertainment committee consisted of Fred Pratt, Winnipeg Elec. Rlwy., chairman; Art McFadyen, Standard Underground Cable Co., secretary; F. C. Robarts, Great West Elec. Co., Ltd.; J. H. Schumacher, of Schumacher Gray Co., Ltd.; R. D. Smith, of Filer-Smith Machinery Co., Ltd.; H. C. Stephenson, of Cochrane, Stephenson & Co., Ltd.; H. Franklin, of Canadian Fairbanks-Morse Co., Ltd.; H. F. Allen, of the Great West Electric Co., Ltd., and H. Darrocott, of the Winnipeg Electric Rlwy. Co.



Entertainment Committee of the Manitoba Electrical Association. Left to Right, Back Row: R. F. Kingsbury, John Henry, R. D. Smith, K. C. Ferguson, H. L. Matthews. Front Row: H. Franklin, F. C. Robarts, H. Darrocott, M. E. Deering, J. Swan, H. F. Allen, H. C. Stephenson. Front: Fred J. Pratt, Art. McFadyen.



Women and Children boosting the Slogan "Do It Electrically." This is just a few of those in Attendance on this Memorable Occasion.

Mr. Cambridge Writes regarding Unreliable Ground Clamps

Winnipeg, Man.

Editor, Electrical News,

In working out some installation rules calling for the inside wiring contractor to install grounding conductors for the purpose of grounding the neutrals of single phase systems, same being auxiliary to the main grounds installed by the power companies, I have been struck with the inadequate type of ground clamps now on the market. In fact, we found it absolutely impossible to obtain what I think is a sufficiently good clamp for the above purpose and have been driven to the necessity of having a local manufacturer make these up to our own specifications.

To show that our complaint as to the type of clamps is also agitating other inspection interests, I would like to quote the following opinions on this subject.

Mr. W. J. Canada, Chief Engineer of the N.E.L.A., at the convention of the National Association of Electrical Inspectors, Philadelphia, October, 1920, made the following statement: "One of the worst obstacles to thoroughly reliable grounding of circuits has been the frailty of the various ground clamp devices marketed for connecting the sturdy ground wire with the even more sturdy water pipe."

President Devereau in commenting on Mr. Canada's remarks said: "One of the greatest troubles seems to have been a first class, A1, reliable and dependable ground clamp."

It is also apparent that the same question is agitating the electrical fraternity in Great Britain, for at a meeting of the National Association of Supervising Electricians in London, on June 15th last, Mr. Allan Kirk is quoted in the "Electrical Times" as saying: "The writer has not yet seen what he thinks a sound bonding clamp on the market," and in the recent issue of Handbook No. 4 of the Bureau of Standards, being the discussion of the National Electrical Safety Code, I find the following statement on page 26, under the head of Ground Clamps: "There is a great need for stronger ground clamps than have been in general use. Many ground clamps are of rather flimsy construction, making their usefulness uncertain."

I am sending the above remarks on to you, trusting they may be the means of awakening a little interest on the part of manufacturers of these devices, believing that if this demand were catered to, the manufacturers would find a ready market. It should be remembered that a clamp that may be suitable for one purpose may not be suitable for another, and when we

have to deal with the grounding the neutrals of secondaries, the whole grounding installation should be of the most thorough and effective nature and the efficacy of the grounding should not depend on improperly designed appliances of the character criticized. Yours sincerely,

F. A. CAMBRIDGE,
City Electrician.

Diamond Fibre at Canadian National Exhibition

The Diamond State Fibre Company of Canada, Limited, will be represented at the Canadian National Exhibition to be held in Toronto during the two weeks beginning August 27th. The exhibit will be in the Industrial Building and will be of particular interest to manufacturers of every line of merchandise. The different grades of raw material will be shown, as well as the finished product in the shape of noiseless waterproof gears, machined parts for electrical use, receptacles, automotive parts, etc. There will also be exhibits of articles in which Diamond fibre has been utilized for machined parts in the place of wood, metal, rubber and other substances. Representatives of the company will be at hand every day to thoroughly explain Diamond fibre and its uses to anybody interested. Out-of-town customers are cordially invited to make the Diamond-Fibre booth their headquarters while in Toronto.

An article on the Toronto Automatic Substation, which appeared in The Electrical News of July 1 was credited to H. C. Sutherland. This should have read W. F. Sutherland. Mr. Sutherland is a member of the engineering staff of the Toronto Transportation Commission and was intimately associated with the design and erection of this station.

The Benson-Wilcox Electric Company, wholesale electric supplies, London, Ont., reports that business has been particularly good, and especially so in electric fans. They have been able to meet all demands, however, and state that they are in a position to fill orders promptly for every kind of electrical supplies.

Mr. C. B. Coulson has resigned from the Operating Department of the "Cedars Rapids" Manufacturing & Power Company and has accepted a position with the Canadian General Electric Company in the Supply Sales Department, Montreal.

A. F. Zacher has resigned, effective at once, as district manager of the Buffalo office of Economy Fuse & Mfg. Co., home office and factory, Chicago, U.S.A.

Report of Accident Prevention Committee of Canadian Electrical Association

It has been the custom of the Accident Prevention Committee to present a detail report, giving the membership, various plans and methods of carrying on the work and also, possibly, some refinements in matters of design or operation. At conventions these have apparently been well received, but have they been put into effect by the member companies? Your committee has reason to believe that they have not. With this information before us the committee believes that it is not details the membership requires, but rather to acquire the belief that accident prevention and health promotion have a real place in the work of an industry or public utility. Every manager of an industry or public utility will say he does not want his men injured or ill; every workman will say that he does not want to be injured or ill. Do they mean it? Or do they really mean,—if it will cost little money or effort? This by no means applies to all companies, nor to all workmen, but is by no means a rare idea.

After graduation from a technical college, a young man served at the front and on his return was married. Due to lack of opportunity to get into engineering work, he took a job as an assistant mechanic. After working for a time, the machine that he was attending met with an accident and he was killed, leaving a wife and a three-months-old baby.

Who was responsible?

1. The engineer who laid out the plans, so that the machine could meet with an accident of this kind.
2. The foreman for not instructing the workman of the danger.
4. The workman for not realizing his dangerous position and taking steps to protect himself.

Who suffers?

1. The company, by the cost of compensation and disorganization of staff.
2. The man, with his life.
3. The widow and kiddy.

Gentlemen, some of your committee have gone through the work of investigating fatal accidents, and have seen some of the results that are not shown on the books of any company nor in the details of organization. These results are anything but pleasant to look upon, and as a suggestion to any manager who is not carrying an active organization for the prevention of accidents, we would recommend that he carefully investigate, personally, the next serious or fatal accident which occurs to one of his employees. Let him not look for an excuse for the accident, but get at the fundamental cause and visit, if possible, the dependents. They may be a foreign mother with small children among strangers, whose tongue they do not speak and who do not speak theirs, but the ties of father and husband are just as dear as in those of the most cultured.

Among those companies that have definite organizations in accident prevention and health promotion there has been a decided lowering in lost time due to these causes, greater production on account of better physical condition, and lower labour turnover due to the desirability of working for the company. Detailed facts have been presented before referring to these matters and can be produced. Your committee, however, would warn against an excited campaign with no definite permanent organization. Unless the organization can be as definitely part of the whole plant as that of the treasurer, then no good results can be expected.

Need of Organization

It is possible to build a power plant without any pre-arranged designs or definite organization, and it is possible to

carry on the commercial side of an organization without a definite plan, and it is not necessary to advise this association of the results that will be obtained. Similarly, it is possible to carry on a so-called accident prevention campaign or one dealing with the matter of the health of the staff without a definite organization and plan, but the results will be anything but those desired. Companies apparently realize that accidents interfere with the successful carrying on of their work, and realize that if their staff is in poor health the best results cannot be obtained. What they do not seem to understand is, that by applying to these problems the expert knowledge that is available, they can reduce accidents and improve the health of the staff. From information available to your committee they know that this work is carried on successfully from a purely economical and financial standpoint, and they also know that where these activities have been carried on there has been an improved relation between staff and management, and increased efficiency in the operation of the utility.

We wish to draw your attention to the report of the Accident Prevention Committee of the National Electric Light Association, which gives a number of details for those who are interested in the subject. We would also direct your attention to a series of articles appearing in the N.E.L.A. Bulletin from January to June, 1921, dealing with the subject, and prepared by experts in the various spheres.

We do not wish it to be understood that your committee has not carried on its regular work during the year, but wish to impress upon the membership that before accident prevention and health promotion can be said to be a real factor in public utility operation in Canada, there will have to be more interest shown, both on the part of management and men in the large and small companies than there is at the present time.

Medal for Resuscitation

Before closing this report mention should be made of the medal which the association offers to anyone throughout the Dominion who resuscitates any other person from electrical shock by the Prone Pressure Method. The medal, besides being an insignia of which anyone could be proud, will also have an historical bearing in-so-far as the metal of which it is to be made will have been used for a feat of some kind in the development of the electrical industry. For instance, the first lot of medals will be struck by using copper which was in service on the first high-tension transmission line in the British Empire some thirty years ago. When that first lot is exhausted, some other metal of equally significant meaning will be used, and so on.

The purpose of this medal is to stimulate a greater interest in the thorough practice and drilling of the Prone Pressure Method of resuscitation from electrical shock, which, besides its humanitarian aspect, will also tend to diminish the number of unfortunate casualties which, in most of the cases, ought not to happen at all.

The suggested routine in dealing with applicants for the medal is as follows:—

1. After a case of successful resuscitation, the person who performs it, or his company, shall, as soon as possible thereafter, report the case to the Accident Prevention Committee of the Canadian Electrical Association. Such report shall contain details as to time, place, voltage of conductor, time required to restore patient to consciousness, opinion of witnesses or physicians as to the extent of suspended animation, and such other information as will enable the committee to intelligently pass upon the merits of the case.

2. The Accident Prevention Committee of the Canadian Electrical Association shall review all cases so reported and, if necessary, obtain further information. It shall also make a decision as to whether or not the medal applied for shall be awarded in each particular case, and shall report each case

and its findings thereon to the executive committee of the Canadian Electrical Association, transmitting therewith the committee's recommendations as to the time and place selected for the presentation of the medal.

3. The Accident Prevention Committee, after making such report to the executive committee of the Canadian Electrical Association, shall then inform the applicant, his company and the president of the Canadian Electrical Association, as to the time and place at which the presentation will be made.

4. The medal shall be awarded in meritorious cases of resuscitation from electrical shock by the Prone Pressure Method, to employees of utilities in Canada by the decision of the Accident Prevention Committee of the Canadian Electrical Association.

5. The medal shall be presented by the president of the Canadian Electrical Association or his appointee.

6. A suitable certificate describing the accident and the service rendered, shall be presented with the medal, the same to be signed by the president of the Canadian Electrical Association.

This, briefly stated, constitutes the main features in connection with the donation of this medal, and it now remains to be seen who will be the first recipients.

Respectfully submitted, Wills MacLachlan, chairman; A. P. Doddridge, V. Laursen, L. A. Kenyon, J. T. Lambert, J. H. Martin, E. Puxton, E. Vinet, J. S. H. Wurtele, John L. Collins.

Public Relations Section Report

As your representative, I attended meetings of the N.E.L.A. Public Relations Committee, and, by correspondence, kept in touch from time to time with the activities carried on by the National Committee. These activities consisted in the issuing of the Kilo Watt Pamphlets which have been sent to all Class A members, and the co-operation with the National advertising campaign, for which the National Electric Light Association appropriated a very large amount of money, and the manufacturers of electrical apparatus of the United States devoted a large portion of their regular advertising space. The object of this campaign was the education of the reading public along the lines of enlightenment as to the importance of the electric utility to the community, and the necessity for moral and financial support by all interested in the progress of their respective municipality. The committee also sought publicity through moving picture films, which will be circulated very widely throughout the United States, and will no doubt be available for use in Canada if requisitioned.

Owing to the wide circulation given to the Kilo Watt Pamphlets, and owing to the fact that the Canadian companies were given the advantages of the publicity work through the circulation of the "Saturday Evening Post" and other magazines in which these advertisements were inserted, due to a wide Canadian patronage of these papers, and acting partly on the advice of the N.E.L.A. officials, it was thought that for the past year it would be advisable to confine our Canadian efforts to the mediums put in motion by the N.E.L.A. To commence a campaign of equivalent effectiveness or dimensions in Canada would have required a considerable amount of money and meetings of representatives from the different provinces, which it would have been very difficult to obtain. In the belief that the best policy was to await developments of the N.E.L.A. campaign, we have not even appointed any additional members to the committee this year. Possibly the new committee which should be appointed for the next year will consider it wise to Canadianize the Kilo Watt Pamphlets by rewriting them, giving Canadian statistics and comparisons rather than United States statistics,

as these pamphlets have met with considerable success in the States. In case this is done, it would involve a large expense in printing, and orders for a large number of copies should be first obtained in order to lessen the overhead involved in the setting up cost.

D. H. McDougall, Chairman.

A Continental Trunk Telephone Cable

The installation of an armoured trunk telephone cable 22 miles long has recently been completed between Luxembourg and Diekirch for the Luxembourg Posts and Telegraphs Administration. The cable is a composite one of 36 pairs in multiple twin formation, and is balanced and loaded for phantom working. It is the first trunk telephone cable to be installed in the Grand Duchy, and is particularly interesting on account of the extremely low values of cross talk which have been obtained, a very high standard in this respect having been called for. Freedom from cross talk depends very largely on the skill and care which are exercised in the joining in of the loading coils, as well as on the balancing of individual loading coil sections. On loaded lines in this country the coils are usually connected up by the Post Office, so that contractors obtain very little experience of this work, but, in this case, it was carried out under the supervision of Messrs British Insulated & Helsby Cables, Ltd., who did all the testing and were responsible for the final results. The loading coils were of the latest dust core type, and were supplied by Messrs. The Western Electric Co., Ltd. Woolwich. On the completed cable, the values of cross talk obtained in any quad, the unit of measurement being one millionth of the electromotive force applied to the interfering circuit, were as follows:—

	Between side Circuits.	Between side and phantom circuits.
Average of all quads	50	105
Three greatest values	130, 130, 120	350, 250, 200

It is claimed that this cable far excels any other cable on the continent in freedom from cross talk.

Steam Tables For Condenser Work

The Wheeler Condenser & Engineering Co., Carteret, N.J., announce the publication of the 1921 edition of their "Steam Tables for Condenser Work". This is the sixth edition of a work which for many years has been widely used by engineers dealing with the condensation or evaporation of steam. The tables are in a handy book form, pocket size. The properties of saturated steam are tabulated from 29.8 in. vacuum to atmospheric pressure in increments of tenths of an inch referred to a 30 in. barometer. The values were especially calculated for this book by Professor Marks. As it is customary in vacuum work to read vacuum in inches of mercury, this is superior to the old method of giving absolute pressures in lbs. per sq. in. Above atmospheric pressure the increments are in pounds gauge. The book explains how measurements are made by means of the mercury column and barometer, and gives constants and tables for making corrections. Corrections for the thermal expansion of mercury, for the relative expansion of mercury and brass scale, and other corrections are included.

Chilliwaek Electric Co., Ltd., has undergone a change in management. Mr. Ralph Marsh, formerly of Kamloops, B.C., having bought out Mr. G. Olson's interests, the latter having retired from the company. Mr. Marsh is an electrician with considerable experience, having formerly been in business in Sheffield, England. Coming to Canada, Mr. Marsh established an electrical business in Kamloops, where he was very successful. He sold out there last year.

An Important and Varied Exhibit of Electrical Appliances and Equipment

A feature of the Niagara Falls Convention of Municipal Electric Utilities that is growing in interest and importance each year is the exhibit of various electrical appliances and equipment. This year there was a very fine display—considerably the best that has ever been shown—and the interest taken in the exhibit by the delegates was proportionately greater. The following companies were represented: Canadian General Electric Co.; Canadian Westinghouse Co.; Hoover Suction Sweeper Co.; Northern Electric Company; Lincoln Meter Co.; Packard Electric Co.; Ferranti Meter & Transformer Mfg. Co.; Square D Box Co.; National Electric Heating Co.; R. E. T. Pringle, Ltd.; Onward Manufacturing Co.; W. A. Kribs Co.; Slade Manufacturing Co.; Coffield Washer Co.; Gillespie-Eden Corporation; Hurley Machine Co.; Lyons Electric Co.; 1900 Washer Co.; Canadian Ironing Machine Co.; Canadian Porcelain Co.; Slater-Barnard Co.; Robbins & Myers; C. A. Branston Co.; National Equipment Co.; Keith's Limited; Easy Washing Machine Co.; Moffatt's Limited; Hydrola Phonograph Co.; Canadian Edison Appliance Co.; McClary Manufacturing Co.; Earle Electric Co.;

The details of the exhibit were of special interest in certain cases.

Northern Electric Company.

This company were making their first exhibit in Canada of their new "Serve-U" washing machine, which will be on the market early this autumn. This machine has been designed by Mr. Callahan, who was present, as was also Mr. Delo of the company's engineering department. It is claimed for this machine that it has fewer running parts than others. It is closed on all sides and at the top with white enamelled metal. The tub, which is of copper, is so shaped that when a metal paddle moves backward and forward with a steady even motion the water is constantly agitated in the form of the figure 8 and forced through the clothes. It is supplied with a special design adjustment wringer.

National Electric Heating Company.

Household appliances of every kind were shown by this company, including their latest type "C-6" range, equipped with heavy duty 9 inch burner and with complete enamelled flashers and shelf. The exhibit included a complete line of hot plates, including the new 3-burner type with capacities of 1000, 1200 and 1700 watts respectively, each controlled by a three-heat switch. A complete line of domestic and tailors' irons was also shown, as well as toasters, toaster-stoves and circulation water heaters.

Hydrola Phonograph Company.

The Hydrola phonograph was shown in three new models. These are manufactured by the National Table Company, of Owen Sound. The exhibit was in charge of Mr. Bellingham, 111 Hilton Ave., Toronto.

Lincoln Meter Company.

The Lincoln Meter Company had an attractive exhibit. Their standard indicating instruments were shown, Lincoln graphic meters, and their attachment for measuring volt-amperes. A very striking demonstration for showing the difference between watts measurement and volt-ampere measurement was staged. Two standard Lincoln meters were mounted on a board, one measuring watts and the other, by means of a v.a.d. attachment to read volt-amperes, and a 5 h.p. motor running light was connected to this instrument. The wattmeter read 400 watts and the other instrument 1600

volt-amperes, showing that the power factor under this condition was 25 per cent. It would appear that this simple attachment enables power factor to be taken care of in a very satisfactory manner.

This instrument showed some very novel points of design. In place of the ordinary clock, the meter is operated by a small synchronous motor. The operation of the metering elements is such that the load is integrated over a ten minute period before the pen reaches its maximum swing; thus, should fluctuating load no blotting occurs and a definite reading, namely, the highest point the pen reaches, is attained. The insertion of the paper has also been greatly simplified. We understand this is the first graphic demand meter to be made entirely in Canada.

Canadian Westinghouse Company.

A new range with a porcelain enamelled oven and easily removeable element was a prominent feature of the Westinghouse exhibit. This is a Canadian-made machine, and in workmanship and appearance appears to be superior to anything this company has ever marketed in the way of ranges. Other equipment displayed by this company included electric fans, radiators, irons, toasters, lamps, etc.; there was also an interesting showing of single phase motors, and service transformers and meters. The Canadian Westinghouse Company have also now joined the army of washing machine motor manufacturers and displayed this latest addition to their family—a semi-enclosed flash-proof type, ruggedly constructed machine, made in one-sixth and one-quarter h.p. sizes for both 25 and 60 cycle. These machines are all built on the same sized frame.

Robbins & Myers.

Fans and motors constituted the R. & M. display. Their entire line of electric fans, namely, 8 inch, 110 volt Universal; 9 inch, 110 volt Universal Desk and Oscillating; a Desk and oscillating 12 inch A. C. and oscillating 16 inch A. C. were shown. The motor exhibit included their washing machine type and a new 25 cycle $\frac{1}{4}$ h.p. Utility motor, specially designed for farm work. This motor is mounted on a tripod and is equipped with a 5 step V-grooved pulley for driving at different speeds. Other motors in the exhibit included a new type repulsion induction motor, $\frac{1}{2}$ h.p., 110 and 220 volts, 60 cycle. A 25 cycle machine of the same characteristics will be produced shortly. There were also some smaller sizes of squirrel-cage polyphase motors, which types, up to 25 h.p., are being built at the Canadian factory.

Square D Factory.

The latest improvements on externally operated switches were shown, including many patented features; also an absolutely new line of service switches for ranges, heating and lighting. Mr. Keeling, sales manager of the company, stated that an attractive new catalogue is in course of preparation, which he will have ready to send out in the very near future.

Canadian Edison Appliance Company.

This was a very complete display of electrical appliances. Particular attention was directed to the Hotpoint percolators.

Hurley Machine Company.

A new cylinder, known as the "Thor Luminoid," was shown for the first time. This material is claimed to have absolutely no affinity for grease, soap or alkali. No scum or coating will collect either inside or out and it will not rust or wear. In addition, this company showed their new automatic ironing machine, which attracted a great deal of attention from the delegates. It is entirely automatic, electrically operated in every respect and all the operator has to do is to pull a lever and the shoe will move either backward or forward, as desired. The exhibit was in charge of the manager, F. W. Chapman.

Easy Washing Machine Company.

This company showed their Model H washing machine, fitted with a copper tub and also with a nickle-zinc tub. The latter is a new type which is being marketed at a lower price.

1900 Washer Company.

Three models were shown, namely, 12 sheet, and 8 sheet capacity copper tub, as well as a medium priced wooden tub machine. The 8 sheet type is designed for the average home, the 12 sheet size for larger residences and institutions of various sorts.

The Hoover Suction Sweeper Company.

Both special and Baby models were shown and the new features demonstrated. This company also displayed a number of their most recent show cards, one of which—the Little Girl Cutout—attracted considerable attention. Thos. F. Kelly, sales manager, was there, as were also district managers G. T. White of Windsor and S. M. Philpott of Hamilton.

McClary Manufacturing Company.

A display of domestic electric ranges featuring seamless sanitary ovens and protection service elements. There was also shown an electrically heated diet table with plate warmer base, which is said to be finding favor in hospitals and such institutions.

Earle Electric Company.

This company was showing the Pneu-Vac Cleaner, for which they have recently taken the Ontario agency. Mr. G. D. Earle claimed many superior characteristics for this machine, including a very efficient and complete line of attachments.

"Peerless" Water Systems.

The display was in charge of J. B. Skaith, for the National Equipment Co., of Toronto, who explained that the outstanding features of the equipment were the simple and automatic control through changes of pressure, and the assurance of a continuous supply of water regardless of possible interruptions in the current.

Canadian General Electric Co.

The Canadian General Electric Co., Limited had a very artistic booth, displaying a complete line of wiring devices, pipe fittings, switches, fuses, etc., all of which are "Made in Canada." Canadian made Edison Mazda Lamps were also prominent in the foreground, including the now famous cut-out of the Edison Mazda Girl. The C. G. E. sales policy of packing their wiring devices in individual cartons, and giving each device an artistic label, cannot help but have its results from the sale standpoint. The more interesting and simple electrical goods can be made, the better for the whole industry. An interesting feature of the C. G. E. exhibit was the hundreds of Edison Mazda Lamp puzzles handed out from their booth.

Packard Electric Company.

The latest type of steel transformer cases with heat dissipators was shown by the Packard Electric Co. The advantages noted were that the transformer is of smaller size, owing to the fact that the fins radiate the heat more readily. It follows, also, that the transformer is much lighter in weight, can be handled more easily, and larger capacity can be installed on poles.

The Ferranti "Kid."

The "Kid" is the latest addition to the Ferranti line. It weighs only 4 lbs. It is made in sizes up to, and including, 20 amperes, in both single-phase two-wire, and single-phase three-wire. For sizes above 20 amperes, the company state that they are continuing to supply the Type "C" meter. "Kid" meters are now ready for delivery in 25 and 60 cycles.

The exhibit also showed Ferranti transformers and service type transformers, together with a line of Ferranti M.

I. ammeters and voltmeters for switchboard mounting. Another feature was a display of switchboard structural fittings, indoor and outdoor types, disconnecting switches, choke coils and bus supports, as manufactured by the Electric Power Equipment Corporation, Philadelphia, for which the Ferranti Company are selling agents. This same exhibit was also shown at the Quebec convention of the Canadian Electrical Association the previous week.

Onward Manufacturing Company.

The "Sunny Suds" electric washing and wringing machine was on display by this company. It is an all-metal washer of the oscillating type, with copper tub and aluminum wringer. It is the usual household size with full $\frac{1}{4}$ h.p. motor and well equipped with safety devices. Mr. W. L. Wilton, of the sales department of the company, was in charge.

R. E. T. Pringle.

Something new in water heaters, the Sepco, was shown by Mr. Stranzsky. Mr. Ross Osborne was also in attendance. These are built in various sizes suitable for installation as required at different points in the home. The smaller sizes are adapted to a great number of purposes, from barber shops to soda fountains. The sizes vary all the way from 40 gallons down to three gallons.

The Brantford Washing Machine Co.

The "Locomotive" is claimed by Mr. Lyons to be a real masterpiece in washing machine design. There is an entire absence of any moving mechanism inside the tub. The tub, with its weight of clothes and suds, rests on a cradle which runs on rollers. With the wringer tightened down tight and the tub fully loaded, it is claimed that the motor may be started without blowing a 10-amp. fuse. The machine is so designed that it may be used as a kitchen table or work bench, and the motor may be utilized for driving other apparatus.

Klymax.

This machine uses the vacuum cup principle for washing and the centrifugal method for drying. The cycle of operations necessary in washing and drying clothes is claimed to be so arranged that the labor of the operator is minimized; the dirty garments are put into the machine and not disturbed until they have been washed, rinsed, blued and wrung with the wringer—and without any work on the part of the operator except the movement of a single lever.

Central Electric Joins up with Masco Company

On July 1st, The Central Electric Company, Limited, moved from the premises at 36 Adelaide Street West, which they have occupied for many years, to 78 Richmond Street East, where the company will be under the operation of The Masco Company, Limited. The field of operation covered by the electrical supply jobbers today is so very wide that it was found that considerable economy in the matter of general overhead could be effected under this scheme and at the same time the customers of both companies would benefit by the amalgamation. Mr. C. A. McLean, manager The Masco Company, states that three floors of the modern warehouse purchased by his company recently will now be repurposed for the use of the two companies and excellent facilities for the display for both appliances and fixtures are at the disposal of the trade.

The Westinghouse Electric & Manufacturing Company has just printed Folder H56 entitled "The Center of Power." This folder illustrates the many uses of the small motor, and encourages the use of labor-saving machines in the home, office, shop and farm.

Up-to-Date Methods of Lighting Buildings

Benefits of Proper Illumination. Factors to be Considered in Design

There are few investments which give a better return than the money spent to procure good lighting either in the factory or the home.

It is now generally recognized that good lighting in a factory or office building will increase production, decrease accidents and improve the general health and contentment of employees. In some sections of the United States this is so well understood that legislation has been enacted which not only compels good illumination in industrial plants, but actually states the value it shall have for different classes of work.

It will usually be found that it costs very little, if any, more to obtain good illumination than it would to have poor illumination. A careful study of the problem before installation will usually result not only in improved lighting, but a lower ultimate cost, and is much to be preferred to the usual haphazard method of locating outlets so often practiced.

To obtain satisfactory lighting the following factors should receive careful consideration, as they all more or less affect the final result and upon the proper weighing of their relative importance depends the ultimate success of the scheme:

- (1) Nature and color of wall and ceilings.
- (2) Spacing of light units.
- (3) Type of reflectors or glassware.

Factor 1 is of great importance, since the relative light absorption of different colors and surfaces vary greatly; for large rooms and using proper reflectors the effect of the wall covering on the illumination may be minimized. While walls finished with a high white gloss are the most effective for reflection qualities. It must be borne in mind that a large expanse of wall surface painted so light as to reflect a large volume of light into the eye is objectionable for office and residence work, or any room where the occupants are likely to sit more or less directly facing the walls for considerable periods of time. Walls finished in buff, light greens or grays will be found usually more favorable than dead white for office buildings. In factory and warehouse buildings it will be usually found that a good washable white finish is the most effective wall covering to use.

Factor 2—Spacing of Light Units.

A single light unit is usually less expensive to install and maintain and is usually more efficient than a cluster of lamps having the same candle power. The spacing of the units will depend upon the power of the individual units used and the intensity of illumination required. Generally speaking, individual units of 250 watts are large enough for small factories, 100 watt for offices and 40 watt for residences. Several outlets distributed over the areas to be illuminated will usually be found to be more efficient and to give a more pleasing effect than concentrating the light into one or two units.

Factor 3—Type of Reflectors or Glassware

The proper choice of reflectors or glassware has more effect upon the general satisfactory results obtained than anything else, since it is upon this choice that absence of glare and uniformity of illumination so largely depend.

There are three systems to choose from:

- (a) Indirect.
- (b) Semi-indirect.
- (c) Direct.

With indirect lighting the ceilings and walls are utilized

for the re-direction and diffusion of the light. Owing to the ceiling acting as a light, source glare is avoided and shadows are soft. This method has its special place in such locations as picture houses, art galleries, etc., but is now little used for general purposes.

In direct lighting the units send the light directly to the surface to be illuminated. Reflectors and glassware are generally used to improve the light distribution and diffuse the rays and give the effect of a large source of light and tend to obviate glare. The glare is further minimized by frosting the glass or, in the case of open reflectors, by frosting the bulbs. Shadows can be softened by the use of proper reflectors or glassware; in fact, as has been stated, the success of a direct lighting system depends largely upon the proper selection of reflectors and glassware, and with the enormous variety now on the market practically any requirements can be met by the use of standard material.

Semi-indirect lighting contains the features of the direct and indirect. With correctly designed fixtures the soft effect of indirect lighting may be obtained with the vertical illumination as obtained from direct lighting, and at the same time the shadows may be graded down to the required depth.

Factory and Warehouse.

For factory and warehouse work the intensity of illumination required, cost of fixtures, presence of dirt and dust, practically exclude any system other than direct lighting. In choosing the fixtures and reflectors consideration should be given to ease of cleaning, liability of surface to collect dust, etc., as well as their value as light distributors.

In offices and public buildings the indirect or semi-indirect may often be usefully employed, the latter particularly lending itself to decorative effects and harmonizing with the architectural designs of the buildings, although it will usually be found necessary to add a few direct lighting units to emphasize certain features of the building.

For private houses the semi-indirect lighting is very suitable for dining rooms and reception halls, but the actual selection of fixtures for a residence is so much a matter of personal taste that it will usually be decided by the owner, apart from any suggestions he may receive.

Standard of Illumination.

The most suitable standards of illumination for various purposes can well be taken as given in General Electric Review, Vol. XXI, No. 6. They are as follows:

Auditorium, church, etc.	1.5— 3
Armoury, public hall	2— 4
School, class room, library, etc.	3— 6
Store, show windows	10— 20
First floor department	2— 10
Clothing, dry goods, millinery, etc.	4— 7
Cigars, grocery, meat, bakery, etc.	3— 5
Office	4— 8
Drawing office	8— 12
Industrial:	
Rough manufacturing such as rough assembly,	
rough forging, rough woodworking, ice making,	
pottery, lumber mills, etc.	2— 4
Medium manufacturing operations:	
Woodworking, rough machinery, rough bench	
work, automatic machine work, meat packing,	
paper making, laundries, etc.	4— 8
Fine manufacturing, fine assembling, leather	
working, fine woodworking, fine lathe work, etc.	4— 8
Extra fine manufacturing, watches and jewellery	
manufacturing, engineering, typesetting, shoe	
manufacturing, cannelling, etc.	4— 8
Building, exterior	1— 2

Electrical Dealers Convened at Hamilton Agree to Join Forces with the Ontario Contractor-Dealer Ass'n.

An important meeting of contractor-dealers, gathered in from various points in Ontario, was held at the Royal Connaught Hotel, in Hamilton, on July 6. The meeting had been organized largely through the efforts of Messrs. G. E. B. Grinyer, of Guelph and J. H. Sandham, of St. Catharines.

The purpose of the meeting was to bring about a closer organization of the trade in the smaller towns of Ontario and for this reason the wide representation was particularly satisfactory. As will be seen from the list below, towns from Windsor to Peterboro were included and many of the most prominent contractor-dealers in the province were in attendance. The meeting was presided over by Mr. E. B. Fewings, of Galt, who spoke briefly but effectively of the need for closer provincial co-operation.

Mr. E. A. Drury, chairman of the Toronto Section of the Ontario Association of Electrical Contractors, and Mr. K. A. McIntyre, president of the Ontario Association both spoke at considerable length, Mr. Drury pointing to the advantages of organization and co-operation as shown in Toronto and Mr. McIntyre dealing with the wider aspect of the case. He dealt with the aims of the Ontario Association, its hopes and accomplishments to date, covering the whole situation regarding dues, the connection with the United States organization, and so on. At the close of his address, the contractors unanimously decided to join up with the Ontario Association.

The scheme of organization of the province, as outlined by Mr. McIntyre, is that each district shall have its own local section, which may be one large city, as in the case of Toronto, or a group of smaller towns or cities, as determined by the wish of the members themselves. These sections will then appoint representatives to act as a provincial executive.

Judging from the interest shown in the organization scheme, the various representatives who attended this meeting will immediately endeavor to form sections in their districts and later appoint representatives to a provincial executive. The logical arrangement of this scheme of organization is evident and when complete, the Ontario Association will, undoubtedly, be a powerful factor in the contractor-dealer field.

Regret was expressed by the meeting for the unfortunate circumstance necessitating the absence of Mr. Grinyer, whose store had been completely destroyed by fire the very morning of the meeting. Below is a list of those who attended this important meeting.

W. G. Taylor, Woodstock Elec. Co., Woodstock; Geo. McGinnes, Davis & McGinnes, Woodstock; E. S. Coppins, Woodstock; T. B. Millman, Woodstock; G. Frampton, J. H. Sandham Co. Niagara Falls; T. J. Minnes, T. J. Minnes & Co., Brantford; A. C. McLean, Brantford; E. A. Drury, 161 Danforth Ave., Toronto; K. A. McIntyre, Beattie-McIntyre, Ltd., 72 Victoria St., Toronto; F. R. J. McPherson, Peterboro; Mr. Thorpe, Grant & Thorpe, Peterboro; J. H. Miller, Peterboro; Mr. Cole, Grimsby; F. Martin, Smith & Martin, Guelph; Mr. Smith, Smith & Martin, Guelph; E. A. Downs, Ingersoll; E. G. Wilson, Kitchener; F. Ellis, Ellis & Howard, Kitchener; S. Howard, Ellis & Howard, Kitchener; Mr. Moffat, Ingersoll; E. J. Haid, Preston; C. F. Schmidt, Kitchener; E. B. Fewings, Galt; Gus. Huether, Hespeler; W. W. Stuart, Guelph; W. W. R. Cowain, Peterboro; F. E. Garfat, Windsor; W. LeFave, Windsor; W. R. Bowley, London; D. F. Winegarden, London; L. R. Folley, London; H. S. Peter, London; M. J. Higgins, Stratford; W. Bennington, Bennington Electric Co., Stratford; H. J. Peter, Peter & Sylvester, Stratford; V. B. Dickeson, Barton-Netting Co. Windsor; Mr. Doerr, Doerr Elec-

tric Co., Kitchener; Frank T. Groome, Toronto; Mr. Mayall, Grimsby; Mr. Calhoun, Square D. Co., Toronto; J. H. Paxton, Sweeper-Vac. Co., Toronto.

Electrical Association of Nova Scotia Holding First Convention on August 16 & 17

The announcement has just been made that the Electrical Association of Nova Scotia will hold their first annual convention on the 16th and 17th of August. The program has not been definitely determined, but it is hoped to make this convention the biggest event in the history of the Maritime provinces. The president of the Association is Mr. W. Murdoch, manager of the Maritime branch of the Northern Electric Company. Mr. E. A. Saunders is secretary and will be glad to hear from electrical men anywhere in Canada who are likely to be in the vicinity of Halifax on that date.

Electric Furnaces Selling in Canada

The Electric Furnace Company, Alliance, Ohio, reports more orders for its Bailly Electric Furnaces in June than in any single month in the last two years. These orders include standard brass melting units, ear furnaces for steel plant purposes, and a special electric enameling equipment. Most of the sales were made to concerns not particularly busy at the present time but who purchased this equipment with a firm belief that by the time the furnaces were installed and ready for operation business would be such as to amply justify the present expenditure. The foundries are exhibiting a desire to modernize their equipment so as to lower their cost of production and meet competition when business again becomes normal. One of these recent sales, to the Empire Brass Manufacturing Company, Ltd., London, Ontario, marks the fifth Bailly furnace sold in Canada during the past year. It is the second Bailly furnace for this plant. It is rated at 105 kw. and has a hearth capacity of 1,500-2,000 pounds.

Valuable Papers Printed

The Ontario Safety League, whose convention was held in April last, has now had the various papers printed and they are ready for distribution in booklet form. This booklet not only contains information in which every man, woman and child in Canada is interested, but it also contains entertaining reading matter. The articles are of a general nature, but have special relation to the safety features of industrial plants.

As pointed out in a recent issue, Mr. R. B. Morley has withdrawn his active connection with the association in order to take up other work, and Mr. J. F. H. Wyse has been appointed general manager. Mr. Wyse is widely known for his enthusiasm in the work of the Safety League, and the continued usefulness and efficiency of this organization is assured under the new management.

The Westinghouse Electric & Mfg. Co. announce a ten per cent. reduction on prices of practically all industrial motors and motor control apparatus, including also all direct current generators and motor generators. This is the second cut of ten per cent. made by this company in motor prices during this year. There is also a reduction in prices on heating appliances such as toaster stoves, toasters, chafing dishes, coals, glow radiators, etc., the new prices to take effect immediately.

W. W. Robinson, western representative of the Jefferson Glass Company, Ltd., Toronto, and the Crown Electrical Manufacturing Company, Ltd., Brantford, is visiting the two mentioned factories and expects to return to Winnipeg about the second week in July.

How to Figure the Selling Price

By C. D. Henderson, President Henderson's Business Service, Limited, Brantford, Ont.

The most important problem facing the Contractor-Dealer is that of figuring his selling prices (either retail or contract), because no matter how big a volume of business he does—no matter how close a buyer he is, if he does not receive enough for his goods and services to cover overhead expense and a reasonable profit he is heading straight for the business scrap heap and the skids are always well greased.

Most contractor-dealers can tell you off-hand the cost of 14 wire or a 660-watt socket. They are as a class fairly good purchasers and are generally pretty well informed as to any special discounts being offered by different jobbers, but when it comes to the selling price, it is too bad to admit it, but the dominating thought appears to be **Beat the Other Fellow's Price** regardless of the consequences.

It is, however, gratifying to know that there are some men in the trade (and their number is increasing) who realize that their success rests on an intelligent application of sound business practice. They know that they have such a thing as overhead expense and that they are entitled to a reasonable profit and that guessing at selling prices will undoubtedly end in disaster. Therefore these firms decide on a definite plan of arriving at their selling prices, and stick to it regardless of what their competitors do.

The proof of the soundness of this policy is a survey of the trade to-day. The firms who have cut and slashed prices during the past few years are suffering from a lack of business.

There is a right and wrong way of doing everything, and this article is written for Electrical News to **again** impress on its readers the right method of figuring the selling price. I say **again** because it's the same problem that has been cussed and discussed for the past five years, possibly in a little different form.

In dealing with this question the important thing to bear in mind is that the selling price consists of three elements:

- 1—Cost (labor and material in case of jobs).
- 2—Overhead expense.
- 3—Profit.

If we fail to include a **proper** amount for any of these elements we need not expect success, as no one has yet found it possible to take 2 from 2 and have 1 left.

The next thing to remember is that the selling price is the **whole**, from which everything must come, and, as the whole of anything is considered 100%, we will consider the selling price as represented by 100%.

For sake of illustration we will assume that the Overhead Expense in the electrical business is 30%, and that we will be satisfied with a profit of 10%.

It is quite evident that element No. 2 (Overhead Expense) and element No. 3 (Profit) consume 40% of our selling price, leaving 60% of our 100% to cover the element (Cost).

Now let us take a sample job of wiring and figure it out the right and wrong way. We will say that this job costs for labor and material \$180.00. What will our selling price be in order to cover our Overhead Expense at 30% and a net profit of 10%?

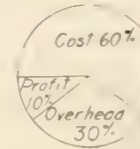
The Wrong Way.

Cost of job	\$180.00
Overhead expense 30%	54.00
	<hr/>
	\$234.00
Profit 10%	23.40
	<hr/>
	\$257.40 Selling price. Wrong

The Right Way.

We know that overhead is 30% and profit is 10%; therefore, cost must be 60%, because these three combined make up 100% (our selling price).

Picture your selling price something like this:



Of course this is in the language of percentages, and we must get these figures into Dollars and Cents. We know that the selling price is 100%, and in order to find what it represents in Dollars we must first find out what 1% is.

Now by referring to our **cost** we find that it is \$180.00, and that it represents 60%, therefore, it is a simple matter to find out what 1% is. Figure it out:

60% is \$180.00.

1% is. $\$180 \div 60 = \3.00 .

If 1% is \$3.00, then it is quite evident that 100% is $100 \times 3 = \$300.00$, and this is our correct selling price, and here is the proof:

Overhead	30%	\$90.00
Profit	10%	30.00
Cost	60%	180.00

Selling price 100% \$300.00

By referring to the example of the wrong method first shown you will see there is a difference of \$42.60, nearly 15%, more than enough to wipe out our profit.

It is not necessary to go to all this figuring to figure out each job or sale. Included with this article is a table that will be some guide to our readers. Find out what your overhead expense is decide what profit you want and then multiply by the figure shown by the table. This will save a lot of extra trouble and will absolutely guarantee you a profit on every article leaving your shop. For instance in the example shown above you will notice that it is necessary to add 66 2/3 to the cost in order to get the correct selling price (instead of 30 and 10 as shown by the wrong method).

While I realize that many Electrical News readers understand all the above perfectly well and apply the proper principle, there may be some of the new members in the trade who have never given the matter any thought and are wondering why they are not making any money. Here's hoping it will reach some of these contractor-dealers in time to save them from falling into the habit of guessing instead of **knowing**.

How to Figure the Correct Selling Price.

If your volume of sales for the year is	Your overhead should be added	If you want a profit of 10 per cent., multiply your cost by	If you want a profit of 15 per cent., multiply your cost by
\$10,000	29 1/2%	165	180
15,000	28 1/2%	163	176
20,000	28%	161	173
25,000	27%	160	172
35,000	26 1/2%	157	171
50,000	26%	156	170
60,000	25%	154	167
75,000	24%	150	164
85,000	23%	147	160
90,000	21%	145	156
100,000	20%	143	154

Returns to Canadian Laco

After a holiday of nearly two years, touring the United States, Mr. Williamson recently returned to Winnipeg to accept the position of western representative of the Canadian Laco Lamps, Limited, Montreal. Mr. Williamson represented the Laco people for six years up to October, 1919, but his firm discontinued on account of the difficulties of getting shipments



Mr. W. A. Williamson

of Laco lamps from Holland. They then decided to build a factory in Montreal, and started manufacturing during the early part of this year. They are now making a strong bid for the business they lost by their offices being closed for about eighteen months. Mr. Williamson hopes to take a trip over his territory in the near future and renew old acquaintances.

Took a Trip East

Mr. J. F. Little, district manager for British Columbia for the Northern Electric Company, attended the annual con-



Mr. J. F. Little

vention of district managers and managers of the parent company's many branches, held on June 27-28-29, in Montreal.

The Northern Aluminum Company, Shawinigan Falls, Que., have been awarded the contract for seven miles of aluminium steel reinforced cable by the Victoria State Electricity Commission, Melbourne, Australia. The cable is 336,400 c.m. and will be used to transmit power from the coal mines, where it is generated, to the city of Melbourne.

Notes of the Trade

Pass & Seymour, Inc., announce that Mr. L. L. Parkinson, has been appointed Chicago District sales manager to succeed Mr. Wm. Hall, Jr. Mr. Parkinson brings with him a wide electrical experience, having been with The Westinghouse Electric and Manufacturing Company for fifteen years. The past eight years he was branch manager of Westinghouse Lamp Company at Detroit. He is an alumnus of Pittsburg University, a Rotarian, a member of the Fellowcraft Club of Detroit, and the Electric Club of Detroit and Chicago. Mr. Parkinson is the inventor of a number of electrical devices and apparatus which are in use throughout the world. The many friends of Pass & Seymour, Inc., may rest assured that the courtesy and service that has been associated with this company for many years, will be maintained by their Chicago organization.

Announcement is made of the marriage on June 29th of Mr. James Lightbody, publicity manager of the B. C. Electric Railway Company, Vancouver, and prominent in electrical association work on the Pacific Coast. Mr. Lightbody was married in Wesley Church, Vancouver, to Miss Evelyn Hewitt, youngest sister of Mrs. J. G. Beaty of Vancouver. Rev. R. J. McIntyre officiated, and Mr. Thomas Hodgson acted as best man, while the bride was attended by her niece, Miss Marion Oswell. Mr. and Mrs. Lightbody visited Portland and other cities to the south on a brief honeymoon, and since their return have taken up residence in Point Grey, at Kerrisdale. Mr. Lightbody is secretary of the Vancouver Electrical Club and also honorary secretary of the B. C. Electrical Co-operative Association.

"Operating History of Westinghouse Turbine Units of 30,000 kw. and Higher" is the title of Reprint No. 91, which gives the operating history of some Westinghouse steam turbine units. This series covers the record of the performances of these turbines, of any trouble they have had, and some interesting features connected with their operation. There are eight articles, embracing eleven of these large units.

Appliances, Limited, 208 King St. W., Toronto, announce that F. E. Hazard and I. A. Schulherr have resigned from the service of that company and that J. D. Cameron, formerly vice-president, has been appointed president and general manager.

Crouse-Hinds Company of Canada, Limited, are distributing an interesting folder, well illustrated, describing their Plug Receptacle Housings, Safety Switch Condulets and Safety Motor-Starting Switch Condulets.

Mr. Gordon F. Perry, president and general manager National Iron Corporation, has been on a visit to England in connection with the proposed manufacturing plant in Canada of the English Electric Company, Limited.

The Harvey Hubbell Company of Canada, Limited, have issued an interesting bulletin describing their "Paraline", the new plug cap with the blades that turn.

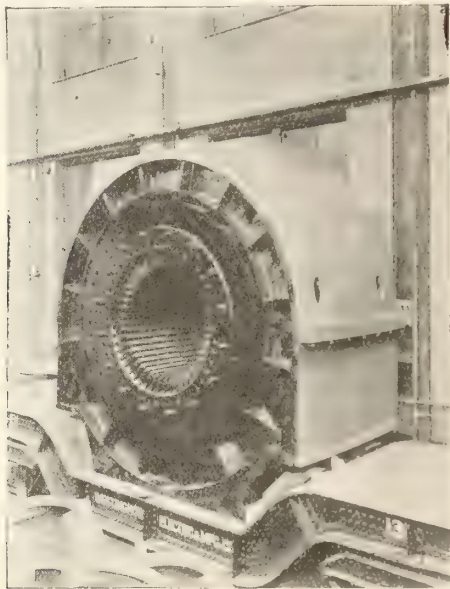
The Ward Leonard Electric Company have issued Bulletin No. 54, describing, with illustrations, Vitrohm resistance boxes for laboratory and college use.

The Crouse-Hinds Company of Canada, Ltd., have issued an attractive bulletin describing ZY type condulets for control of small motors.

The Westinghouse Electric & Manufacturing Company have issued an attractive booklet entitled "Attention Getting Ads."

An Unusually Large Shipment

The accompanying photograph shows the largest single shipment ever made from the East Pittsburgh Works of the Westinghouse Electric and Manufacturing Company. This is the stator of a 25,000 k.w. turbine-generator for the Gold Station of the Brooklyn Edison Company. This generator, when loaded on a special 95 ton car, weighed 201,000 pounds, and because of its dimensions, sixteen feet six inches in height, and eight feet four inches in width, had to be taken over a special route in order to avoid railroad tunnels. When it arrived at the pier in New York,



the lighters which were to carry it across the sound to the Brooklyn Edison Company, had to be reinforced. The workmen, ready to install in its housing, also found added difficulty in that, having no crane facilities, they had to jack up this huge weight a distance of 20 feet. In spite of the difficulties attendant upon shipping, the special car, with its weighty load, went from East Pittsburgh to New York in seven days.

The Luminous Unit Line

Robert O. Fritz, northern representative of the Luminous Unit Company, and the St. Louis Brass Manufacturing Co. of St. Louis, Mo., recently spent several days in Winnipeg. The Luminous Unit Company have a very handsome line of cast bronze fixtures which need very little introduction, as they are favorably known throughout the American continent. There is a Brascolite for every purpose, be it the home, office, store, hotel, church or club. Special needs, however, require particularly special lighting fixtures, so new units, each rising to a dominant point in its smaller and more specialized field, were developed. There is Industrolite, the ideal factory fixture; E-lite, the new two-piece glass fixture for the home and school; Aglite, the fixture of sanitation filling a long-felt want in hospitals, bathrooms and other such places; Concealite, the bank fixture; Jack-o-Lantern, the all-night lamp which operates on alternating current consuming a negligible amount of electricity, and the "Bartlett Noshado Lite", supreme fixture for the operating room.

A Silent Gear That Lasts

There is a general disposition among manufacturers to hesitate about installing "silent" gears because, in certain cases, they have given short and inefficient service, thus costing more in the long run. There is a silent gear on the market now, however, manufactured by a Canadian company (The Diamond State Fibre Company of Canada, Limited), which,

besides being waterproof and oil proof, is claimed to give long and efficient service at a low cost. These gears are made from a special grade of dense fibre of relatively high specific gravity, or with a canvas base, which is adapted for all kinds of gears from the small sizes used in vacuum cleaners, silk and knitting machinery, etc., to the heavy service pinions used on machine and motor drives. Installed in a gear-drive they combine the efficiency and regularity of an all-metal gear-drive with the silent, smooth operation of a belt transmission. Their initial cost, too, is generally lower than the cost of other gears, so that it looks as if they would fill a long-felt want in the manufacturing world.

Book on Electrical Rates

Mr. G. P. Watkins, Ph.D., formerly assistant chief statistician of the New York Public Service Commission for the First District, has written a book on Electrical Rates, which is published by D. Van Nostrand Company, New York. According to the author, few engineers appreciate the character and importance of the principle of differentiation in rate-making, hence this book offers more in the way of explanation and of constructive application of economic principles and goes farther into the fundamental economic costs. The subject of load-factor occupies large space. The scope of the work may be gathered from the chapter headings, as follows:

(1) The Peculiar Interest and Importance of Electrical Rates; (2) Types and Elements of Electrical Rates Described; (3) The Reimbursement of Separable or Prime Cost; (4) Class Rates and Rate Differentiation; (5) Load-Factor Rates; (6) Wholesale Rates and Quantity Discounts; (7) The General Theory of Differential Rates; (8) Suggestions for a Model Rate Schedule. The book is illustrated by three diagrams and five figures, 220 pages, size 6 x 9 inches, blue cloth cover, price \$.

Electric power is being used for rafting operations by the Nashwaak Pulp & Paper Company, at the mouth of the Nashwaak River, where rafts of logs are made up for towing to St. John. Power for the motors used in the operation was supplied by the Maritime Electric Company, Fredericton, whose lines extend across the St. John River to Devon for distribution. About 700 ft. of power line was constructed to bring the power to the scene of operations.

Messrs. Hayward Bros., who run a baking establishment in the city of Fort William, Ont., using electric ovens with a capacity of 3,000 loaves of bread daily, have completed arrangements for the installation of new electrical equipment that will double the present capacity of their plant. Economy, equal distribution of heat, and convenience of operation are some of the advantages of this type of oven.

The Northern Electric Company are distributing a booklet entitled "Standard Electrical Porcelain," with special reference to the product of the R. Thomas & Sons Company, East Liverpool, Ohio.

Mr. W. W. Wylie, for many years head of the Ottawa Car Manufacturing Co., died in Ottawa on June 24th, at the age of 62. Mr. Wylie was born at Valparaiso, Chili, coming to Canada about forty years ago.

Mr. Arthur Lafond, 479 Avenue Laval, Montreal, has obtained the contract for all electrical work to be done on a new plant of the Standard Paper Box Company, Ltd., Montreal.

The Toronto Transportation Committee recently awarded a \$400,000 order for rails, intersections, curves and other track materials with the United States Steel Products Company.

Current News and Notes

Annapolis Royal, N.S.

Mr. Sam Rippey, Annapolis Royal, N.S., has been awarded the contract for electrical work on a new bank being erected at that place for the Bank of Nova Scotia, at an estimated cost of \$40,000.

Beauport, Que.

Mr. Nap. Lepage, Bienville, Que., has been awarded the contract for electrical work on a school building being erected at Beauport, Que., at an estimated cost of \$35,000.

Cap. De La Madeleine, Que.

By a favorable vote of the ratepayers of Cap De La Madeleine, Que., a new electric fire alarm system costing in the neighborhood of \$8,000 will be installed at that place. Tenders will be called during the month of August.

Cornwall, Ont.

The Hydro enabling by-law was defeated by the town of Cornwall, Ont., by a considerable majority, and the franchise of the present company will be renewed.

Coteau Du Lac, Que.

Work will start in the near future on an electric light and power station at Coteau Du Lac, Que. This system will furnish light and power to Coteau Du Lac, Coteau Landing, Coteau Station and St. Polycarpe.

Edmundston, N.B.

Messrs. Marmen & Larlee, electrical contractors, Edmundston, N.B., have been awarded the contract for the electrical work in the new Casino Theatre recently erected in that city for Mr. P. H. Laporte, at a cost of \$50,000.

Guelph, Ont.

The E. B. Grinyer Company, electrical contractor-dealers, Guelph, Ont., suffered a severe loss recently, when a fire, which had its origin in a nearby lumber yard, swept their premises.

Hamilton, Ont.

Messrs. Avis & Jermy, 157 Balsam Ave., Hamilton, have been awarded the contract for electrical work on a department store building recently erected on Ottawa St. N., Hamilton, at a cost of \$50,000.

Kingston, Ont.

Messrs. Beattie-McIntyre, Ltd., 72 Victoria St., Toronto, have been awarded the contract for electrical wiring on a service building to be erected at Kingston, Ont., for the Kingston General Hospital, at an estimated cost of \$95,000.

Lakeview, Ont.

Messrs. Richardson & Cross, 79 King St., E., Toronto have been awarded the contract for electrical work on a school building being erected at Lakeview, Ont., at an estimated cost of \$28,000.

Montreal, Que.

Mr. L. E. Simoneau, 422 Rue Richmond, Montreal, has started the manufacture of electrical appliances.

Mr. A. Lafond, 470 Laval St., Montreal, has secured the contract for electrical work on a factory building to be erected at the corner of Van Horne & Park Ave., Montreal, for the Standard Paper Box Co., at an estimated cost of \$200,000.

Messrs. G. M. Gest, Ltd., Montreal, has been awarded the contract, by the Administrative Commission, for the laying of the conduits for electric wires in District 7, Montreal, at a figure of approximately \$162,000.

Mr. R. Goulet, 822 De Gaspé St., Montreal, has secured the contract for electrical work on an apartment house being erected at De L'Epee Ave., Outremont, at an estimated cost of \$35,000.

Mr. Fred J. Smith, St. Peter St., Montreal, has been awarded the contract for electrical work on a building at the corner of Mount Royal & St. Lawrence Blvd., that is undergoing alterations for the Royal Bank of Canada.

The Central Electric Co., 599A St., Lawrence Blvd., Montreal, has secured the contract for electrical work on 26 residences being erected on Gouin Blvd., Montreal, for Mr. G. Clermont, 2303 St. Denis St., at an estimated cost of \$130,000.

Ottawa, Ont.

The Canada Gazette announces the incorporation of Pitt Railway Equipments, Limited, with a capital of \$100,000. The company will carry on the business of electrical engineers and contractor-dealers. The head office of the company is to be at Montreal, Que.

The incorporation of the Continental Electric Company, Ltd., is announced in The Canada Gazette. The company is capitalized at \$40,000. Head office will be at Toronto, Ont.

St. Boniface, Man.

The McDonald & Willson Lighting Company, Winnipeg, have secured the contract for electrical work on a bank building being erected at the corner of Provencher and St. Joseph Sts., St. Boniface, Man., for the Bank D'Hochelaga, at an estimated cost of \$60,000.

St. John, N.B.

The Maritime Construction Company have commenced work on the building of concrete supports for the transmission line tower between St. John and Musquash.

The city of St. John, N.B., is in the midst of a street railway strike, brought about, it is understood, by the decision of the New Brunswick Power Company to reduce the wages of its employees and to operate one-man type of cars on its lines. Mr. Percy W. Thomson, general manager of the company, states that in the meantime the cars are being altered to the one-man type.

Saskatoon, Sask.

The complete street car system of the city of Saskatoon is reported as having been put under the one-man car system.

Sherbrooke, Que.

Mr. A. E. Choquette, 125A King St. W., Sherbrooke, Que., has been awarded the contract for electrical work on a hospital recently erected at 204 Belvidere St. E., Sherbrooke at a cost of \$600,000.

Stratford, Ont.

At a special meeting of the Public Utilities Commission of Stratford held recently the recommendation of the Hydro-Electric Commission of Ontario for the purchase of the McCloy Building, on the corner of Ontario and Church Sts., Stratford for a hydro shop was adopted.

Victoria, B.C.

The Whittall Electric Co., 1112½ Broad St., Victoria, has secured the contract for electrical work on an addition and alterations to the bank premises of the Canadian Bank of Commerce, corner Fort and Government Sts., Victoria. Also the contract for electrical work on an Indian School recently erected at Stuart Lake, B.C., at a cost of \$175,000.

Windsor, Ont.

Many applications for space in the Electric and Pure Food Show, to be held in the Armories, Windsor, Ont., from October 17 to 24, have been received by Manager R. M. Jaffray, only a limited amount of space now being available for intending exhibitors.

FOR SALE

Almost new 150 k.w. General Electric Generator, 25 cycle, type A. T. B., 550 or 2,300 volts, 500 R.P.M., form B, class 5-150-500. Write Gray-Dort Motors, Chatham. 14-18

Position Vacant—Professor of Electrical Engineering in College in Eastern Canada, duties to commence October 1st, 1921. For particulars write Box 50, Halifax, N.S. 14-15

GENERATOR WANTED—110 Volts D.C. compound wound multi-polar, 8 to 12 K.W. Also switchboard for same. Price and all details to T. H. Morin, St Andre, Kam Co., P.Q. 13

Coal Mining Fatalities in U. S. for Year 1919

A complete statement of the coal-mine fatalities occurring throughout the United States during the calendar year 1919 has just been issued by the Bureau of Mines, Department of the Interior.

The reports received from the inspectors for the year just closed show a reduction of 10.55 per cent in coal-mine fatalities as compared with 1918, while in 1918 the reduction was 4.5 per cent. from 1917 figures. The total number killed was 2,307 in 1919 and 2,580 in 1918, a reduction of 273.

There was a decrease of 128, or 25 per cent., in fatalities resulting from mine cars and locomotives, and a decrease of 198 or 15 per cent. in the fatalities due to fall of coal or rock. Surface accidents show a decline of about 25 per cent. as compared with the previous year. There were however, increases in accidents due to gas and dust explosions and also explosives. There occurred dur-

ing the year nine disasters in which five or more men were killed, representing a total of 201 fatalities.

The worst disaster of the year was the one occurring at the Baltimore Tunnel No. 2, Wilkes-Barre, Pa., resulting from the explosion or burning of a number of kegs of powder, by which 92 lives were lost. This disaster emphasizes the need for stricter regulations relating to hauling men and explosions into the mine at the same time. The question of whether electricity was responsible or not does not affect the consideration of the various dangers which arise in underground transportation and handling of explosives. At best the handling and hauling of explosives is hazardous and such being the case, no one, other than the necessary attendants, should be permitted to ride in cars or cages transporting explosives. As a result of this disaster, the report of the coroner's jury to the governor of Pennsylvania brings out some important dangers to be avoided in the use and transportation of explosives.

The conditions under which the mines were operated in 1919 were not normal as the country has not become adjusted to the new commercial conditions as a result of the war. There were numerous labor troubles during the year and on November 1 a strike almost completely shut down the central bituminous field, with the result that but little coal was mined during the month of November and early part of December. According to the United States Geological Survey for the year 1919 the total production was 458,063,000 tons of bituminous coal which is a reduction of 121,323,000 tons as compared with the previous year. The an-

thracite production is estimated by the United States Geological Survey as 66,200,000 tons, or a reduction of 12,600,000 tons from the preceding year.

MOTORS

No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710	Wagner
" 1	75	3	25	550	480	Westg.
" 1	60	3	25	550	750	Cr. Wh
New 2	52	4	25	550	720	Lanc.
Used 1	50	3	60	550	970	Westg.
Used 2	50	3	25	550	720	Westg.
New 2	35	3	25	550	720	Westg.
Used 1	30	3	25	550	1500	Tor & Hm
" 2	30	3	25	550	750	F. M.
Used 1	25	3	25	550	750	C. G. E.
New 1	25	3	25	550	715	Lanc.
New 1	15	3	25	550	1450	Westg.
" 1	15	3	25	550	750	Lincoln
New 2	13	3	25	550	720	Westg.
Used 1	7½	3	25	550	700	Lanc.
" 1	7½	3	25	220	1500	Tor. & Ha.
New 1	7½	3	25	550	1450	C. G. E.
Used 1	7½	3	25	550	725	Westg.
New 1	5	3	25	550	700	Lanc.
Used 1	5	3	25	550	1440	Excelsior
New 3	3	3	60	200	1120	Westg.
" 4	3	3	25	550	1500	Lanc.
Used 1	2	3	25	550	1400	Westg.
New 2	2	3	25	550	1400	Excelsior
New 2	2	3	25	550	1750	Wagner
New 2	2	3	25	550	1500	Lanc.
" 2	2	3	25	550	1440	Excelsior
New 1	2	1	25	550	1425	Lanc.
" 1	1½	1	25	110	1400	Wagner
New 1	1	1	25	110	1420	Wagner
Used 1	1	1	60	110	1725	Wagner
Used 1	1	3	25	220	1500	Tor. & Hm
Used 1	1	1	25	110	1460	Wagner
New 1	1	1	25	110	1440	Wagner
" 1	1	3	25	550	1425	Lanc.
Used 1	1	3	25	220	710	C. G. E.

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Every Club, Institution, Sanitarium, Boarding House, Hotel and Laundry is a Good Prospect.

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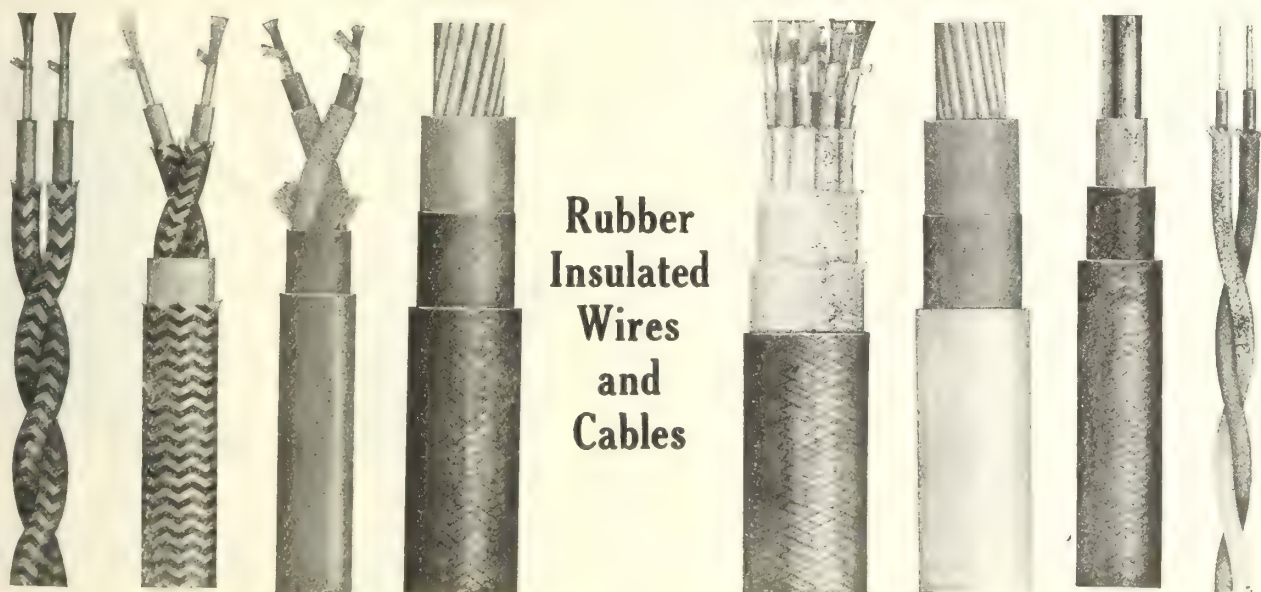


Established
1884

WIRES AND CABLES

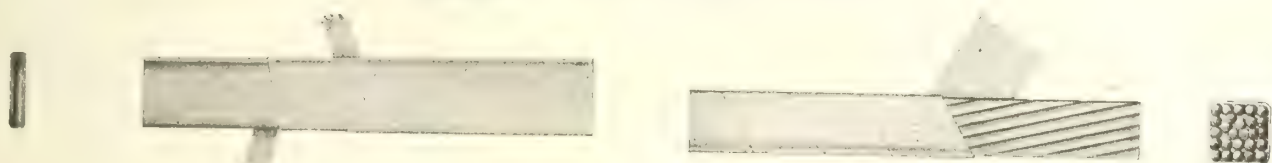
Eugene F. Phillips Electrical Works, Limited

ESTABLISHED 1889

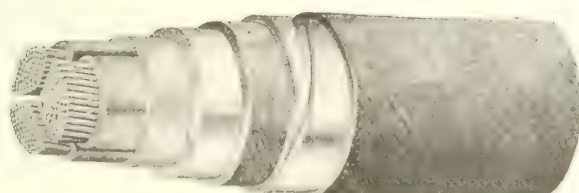


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Wires
and
Cables

Magnet Wires and Cables



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Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

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Non-injurious to the skin, non-inflammable and absolutely permanent.

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Every battery bearing the North Star label is guaranteed to give full satisfaction to the consumer.

Should the battery prove defective, simply satisfy the merchant from whom purchased. He is authorized to replace it.

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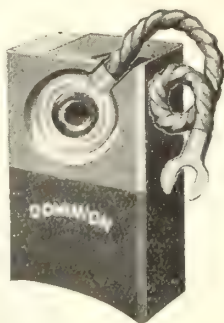
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The Superior Luminous Pendant

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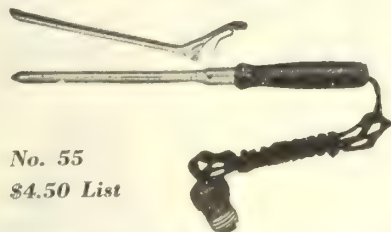
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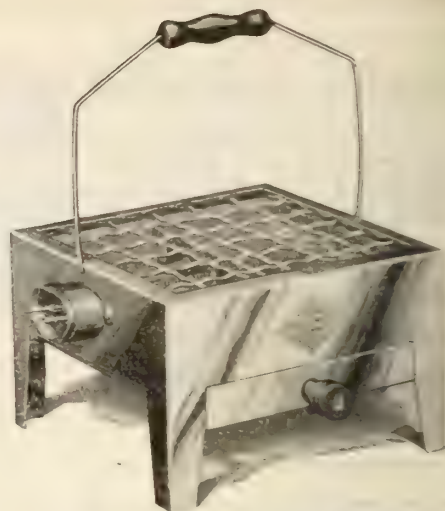
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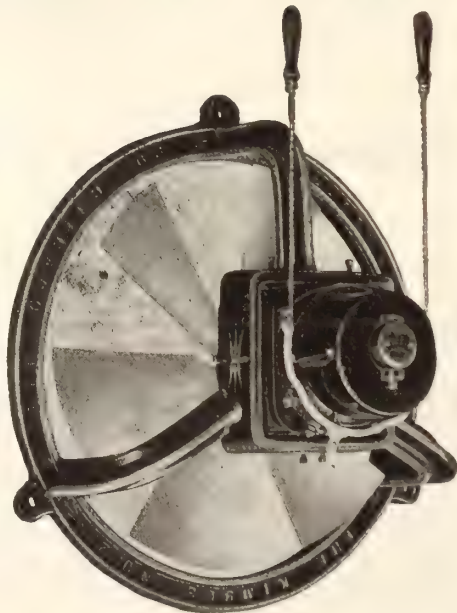
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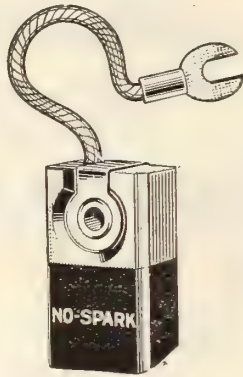
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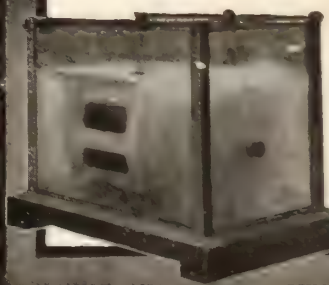
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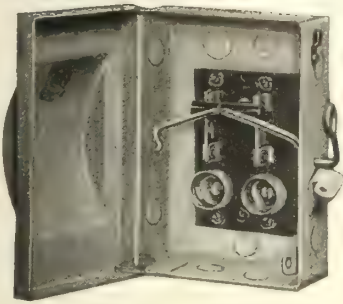
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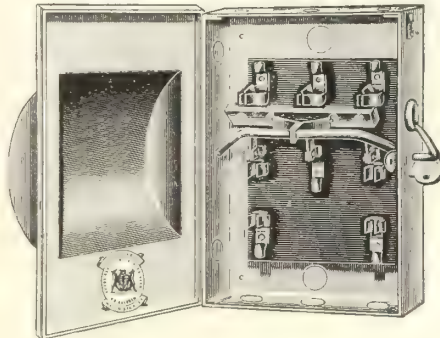
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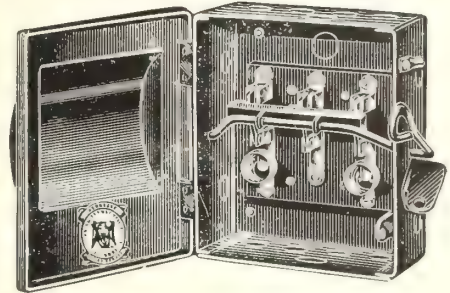
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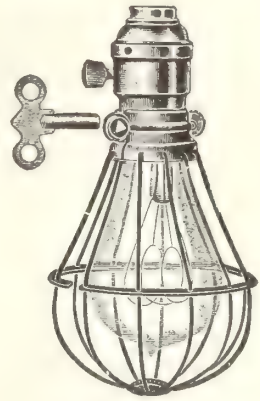
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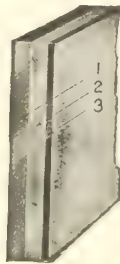
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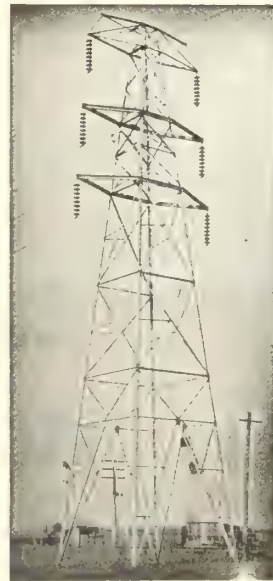


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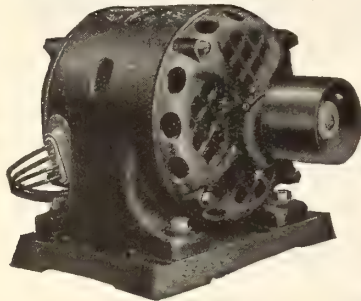
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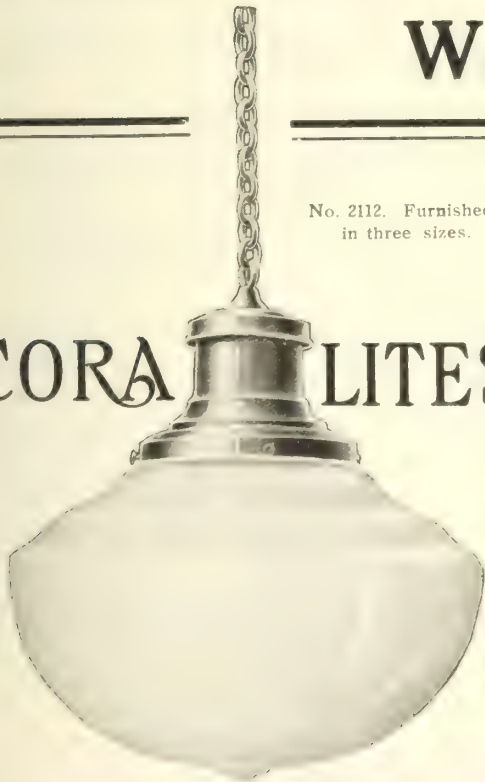
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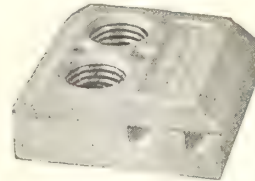
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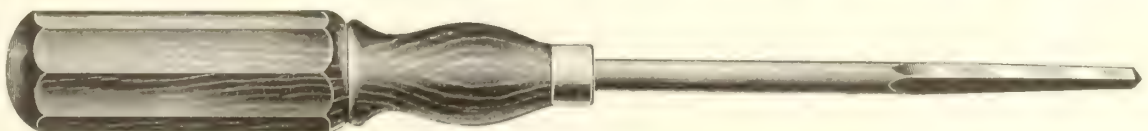
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Canadian Westinghouse Company

CAR EQUIPMENT
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Ohio Brass Company

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Canadian Allis-Chalmers Company

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Northern Electric Company

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Electrical Development & Machine Co.

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Conduits Company
National Conduit Company
Northern Electric Company

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Lincoln Electric Company of Canada

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Hatheway & Knott, Inc.
Killark Electric Manufacturing Company
Northern Electric Company

CONDULETS
International Machinery & Supply Co.

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CONTROLLERS
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Canadian General Electric Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Northern Electric Company

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Dossert & Company

COOKING DEVICES
Canadian General Electric Company
Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company
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Phillips Electric Works, Eugene F.

CROSS ARMS
Northern Electric Company

CRUDE OIL ENGINES
Boving Hydraulic & Engineering Company

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Northern Electric Co. (Chicago)

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DOORS FOR BUS AND SWITCH COMPARTMENTS
Electrical Development & Machine Co.

DREDGING PUMPS
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ELECTRICAL ENGINEERS
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See Directory of Engineers

ELECTRIC HEATERS
Canadian Westinghouse Company
Equate Mfg. Co.
McDonald & Willson, Ltd., Toronto
National Electric Heating Company

ELECTRIC SHADES
Jefferson Glass Company

ELECTRIC RANGES
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National Electric Heating Company
Northern Electric Company
Renfrew Electric Company

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Northern Electric Company
Ohio Brass Company

ELECTRIC SOLDERING IRONS
Clemens Electrical Corporation

ELECTRIC SWITCH BOXES
Canadian Drill & Electric Box Company
Dominion Electric Box Co.
Solex Co.

ELECTRICAL TESTING
Electrical Testing Laboratories, Inc.

ELEVATOR CONTRACTS
Dominion Carbon Brush Co.

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Boving Hydraulic & Engineering Co. of Canada
Canadian Allis-Chalmers Company

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Century Electric Company
Great West Electric Company
McDonald & Willson
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Robbins & Myers

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Diamond State Fibre Co. of Canada, Ltd.

FIBRE (Vulcanized)
Diamond State Fibre Co. of Canada, Ltd.

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Canadian Hart Accumulator Company
Hatheway & Knott, Inc.
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Edmunds & Company, J. H.
Jefferson Glass Company
McDonald & Willson
Nerlich & Co.
Northern Electric Company
Tallman Brass & Metal Company

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Northern Electric Company
Spielman Agencies, Registered

FLEXIBLE CONDUIT
Canadian Triangle Conduit Company
Hatheway & Knott, Inc.
National Metal Molding Company.
Slater, N.

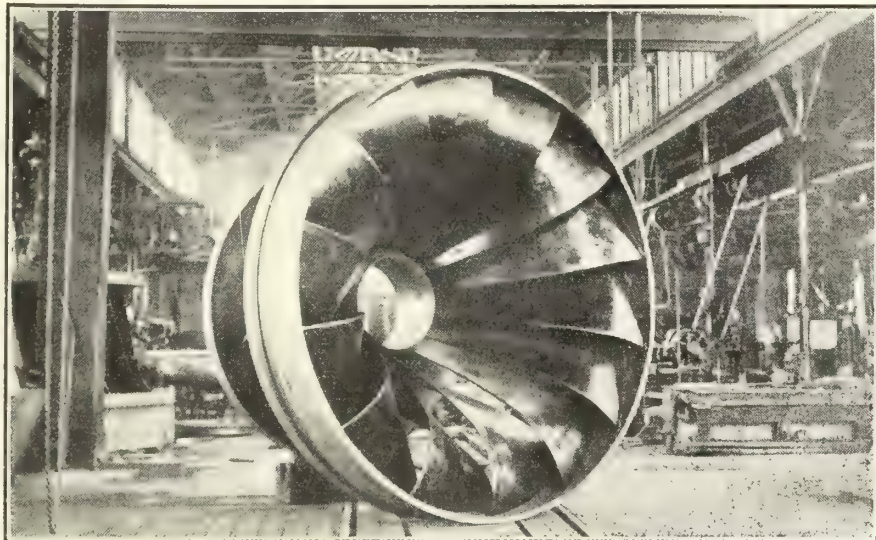
FUSES
Canadian Johns-Manville Co.
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Hatheway & Knott, Inc.
International Machinery & Supply Company
Moloney Electric Company of Canada
Northern Electric Company

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GovernorsTurbo
PumpsHigh
EfficiencySubstantial
ConstructionContinuous
Service

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Northern Electric Company
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Northern Electric Company
Ohio Brass Company

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McDonald & Willson, Ltd., Toronto
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Duncan Electrical Company
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Moloney Electric Company of Canada
Northern Electric Company

LIGHTING PLANTS

Dominion Steel Products

LIGHT-REGULATORS

Dominion Battery Company

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Electric Service Supplies Company
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Ohio Brass Company
Slater, N.
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Steel City Electric Company

LIGHTING STANDARDS

Dominion Steel Products
Northern Electric Company

LOCK AERIAL RINGS

Slater, N.

MAGNETS

Canadian Westinghouse Company

MARBLE

Davis Slate & Mfg. Company

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Leeds Northrup Company
Northern Electric Company

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Edmunds & Co., J. H.

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Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lincoln Electric Company
Northern Electric Company
Packard Electric Company
Sangamo Electric Company of Canada, Ltd.

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Fillion, S. O.
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Mica Company of Canada

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Canadian National Carbon Company
Canadian Westinghouse Company
Century Electric Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
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Lincoln Meter Company
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Robbins & Myers
Thomson Company, Limited, Fred.
Toronto & Hamilton Electric Company
Wagner Electric Mfg. Company of Canada
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Calebaugh Self-Lubricating Carbon Co.
Dominion Carbon Brush Company

MOTOR STARTING SWITCHES

Canadian Drill & Electric Box Company

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Moloney Electric Company of Canada

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Canadian Krantz Manufacturing Company
Devoe Electric Switch Company
Northern Electric Company

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Canadian Allis-Chalmers Company

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Northern Electric Company
Paulding, John I.

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Pittsburgh Reflector & Illuminating Co.

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Electrical Maintenance & Repairs Company

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Marchand Electric Works
Thomson Company, Fred

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Electrical Development & Machine Co.

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Duncan Electrical Company
Northern Electric Company

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Davis Slate & Mfg. Company
Hydeville Slate Works

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McDonald & Willson, Ltd., Toronto
McGill Mfg. Co.
Northern Electric Company

Motors in Stock

- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
 1 10 hp. C.W. 750 rev., starter, rails, pulley.
 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
- 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
- 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
- 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
- 3 ½ hp. 1200 rev. clutch type T.H.E.
 1 1 hp. 1800 rev. split phase Peerless.
- 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs. capacity. New
- NEW SINGLE PHASE MOTORS in STOCK—REPULSION**
- 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE**
- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 2 ¾ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 4 ¾ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 4 ¾ hp. Ohio 110 volt, 60 cycle, 1800 rev.
 4 ¾ hp. Menominee 110 volt, 25 cycle, 1500 rev.

**Toronto and Hamilton Electric
Co., Limited**

HAMILTON ONTARIO

For Value

5—1/6 H.P. 1 phase, 60 cycle, 1750 RPM. 110 volts, new each	30.00
1—1/6 H.P. 110 volts, Universal motor	30.00
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1—1/2 H.P. 3 phase, 110 volts, 25 cycle, 1450 R.P.M.	50.00
3—1/2 H.P. Century, 25 cycle, 1460 RPM. 1 phase, 110 volts, new, each	105.00
1—1/2 H.P. Emerson D.C. motors, 220 volts, 1200 RPM. new, each	50.00
1—7½ H.P. 60 cycle, 1200 RPM. 3 phase, 220 v., complete, new	300.00
1—10 H.P. 60 cycle, 1800 RPM. 220 v., complete	210.00
1—5 KW. Westinghouse generator, 1400 RPM. nearly new, 125 volts	175.00
6—10 H.P. Westinghouse, 3 phase, 25 cycle, 710 RPM. 550 v., base and starter, each	350.00
5—7½ H.P. Westinghouse, 3 phase, 25 cycle, 710 RPM. 550 volt, base and starter, each	290.00
1—50 H.P. 3 phase, 60 cycle, 1800 RPM. 220 volts, or 550 volts, base and starter	700.00
1—35 H.P. 220 volts, 3 phase, 60 cycle, 1200 RPM. with starter	650.00
1—25 H.P. 3 phase, 220 volts, 25 cycle, 750 RPM. Crocker-Wheeler with steel base and pulleys and starter, almost new	625.00
1—35 H.P. Westhse. 3 phase, 25 cycle, 710 RPM., 550 volts, base and starter	650.00
1—30 H.P. 3 phase, 25 cycle, 710 RPM., Can. Gen. Elec., 550 volts, base and starter	590.00
1—100 H.P. 3 phase, 25 cycle, 550 volts, 480 RPM. Westinghouse with starter, new	2250.00
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We also have oil and gasoline engines of all sizes.
 We have some new 1, 2, 3 and 5 H.P. Westinghouse motors, never uncrated, at surprising prices.

Industrial Engineering Company of Canada, Limited
 Consulting Engineers—Electrical Equipment
 R. G. Lee, General Manager

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 28 Wellington St. W. Royal Bank Building



Let Your Workman Be the Judge

When you want to find out if a tool is satisfactory, ask the man who uses it. He knows if it's properly balanced—heavy enough to do the work, and still not so heavy it will tire the workman. He knows how long it will withstand hard service.

OSH KOSH

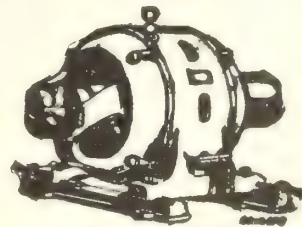
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are the choice of nine out of ten workmen. That's why more Oshkosh Tools are sold than of all other makes combined.

Ask your jobber.

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Motors Generators Transformers

Whether you want a single, a two or a three phase or a D.C. motor of any size, it can be found in our stock.

Here you will find new and re-built Motors, Generators and Transformers offered for sale or exchange from the largest stock of its kind in Canada.

You will make no mistake when you let us fill your Electrical Power Apparatus requirements. Our guarantee protects you. Our policy has always been low prices and a square deal to all.

Wire, 'phone or write us for particulars.

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 Montreal, Que.

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED**SPECIAL HEATING APPLIANCES**

National Electric Heating Company
Reintew Electric Company

STORAGE BATTERIES

Canadian Hart Accumulator Company
Canadian National Carbon Company
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Northern Electric Company

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Benjamin Electric Manufacturing Company
Northern Electric Company
Winter Joyner, A. H.

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Davis Slate & Manufacturing Company

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Canadian Johns-Manville Co.
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Chamberlain & Hookham Meter Company
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G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto.
Moloney Electric Company of Canada
Northern Electric Company
Paulding, John I.

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Devco Electric Switch Company
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Moloney Electric Company
Monarch Electric Company
Northern Electric Company

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Northern Electric Heating Company
Northern Electric Company
Renfrew Electric Company

TOOLS

Northern Electric Company

TOY TRANSFORMERS

Killark Electric Manufacturing Company

TRANSFORMERS

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Ferranti Meter & Transformer Mfg. Co.
Kuhlman Electric Company
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McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited

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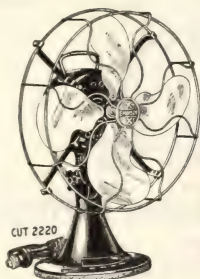
Hatheway & Knott, Inc.
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Give Lasting Satisfaction

Produce the most powerful breeze
and in doing so consume less current
than any other fan.

You will be delighted with the quiet running EMERSON and just as enthusiastic as we are with its speed regulators and oscillating mechanism. Every EMERSON carries a five years factory to user guarantee.

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Double the Life of Your Pole Lines

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OPEN TANK TREATED

British Columbia Cedar Poles

They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices No obligation.

Lindsley Brothers Canadian Co., Ltd., Nelson, B. C.

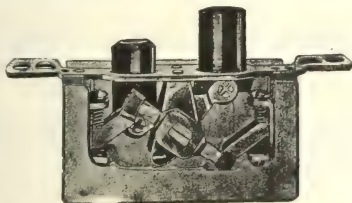
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Irving Smith, 602 New Birks Building, Montreal.

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New England Push Switch



Have You Seen Its Sales Possibilities Yet?

If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

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JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.

ELECTRICAL SLATE & MARBLE

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Our "Fair List" No. 7
Gives Prices and Shipping Weights
PER SLAB

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Exclusive Canadian and Largest American
Electrical Slate and Marble Producers
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131 Shaftsbury Avenue, Toronto, Can.
Five Factories.

ELECTRICAL SLATE & MARBLE

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CIRCUIT BREAKERS

BETTER AND CHEAPER THAN FUSES
THE CUTTER CO. PHILADELPHIA

High Power Storage Batteries

Powerful, Reliable, Efficient.

The Last Word in the Battery Art

A Battery
for Every Car
And Every
Battery
Guaranteed
For 2 Years



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THE MINIMAX ELECTRIC & MFG. CO., LTD.

LASALLE 1797

Office and Works

MAISONNEUVE. MONTREAL, QUE.

Westinghouse

Type M H Electric Range



Built in two distinct types

Semi-Automatic, having a thermostat which rings a bell at any predetermined oven temperature.

Non-Automatic, having no automatic features.

Special Features

Cast iron cooking top with special Parkerized finish, will not scratch or mar readily. Black baked japan finish with nickeled trimmings makes a neat and attractive range, prolongs its life, and is rust resisting.

All circuits are individually fused.

Fuses and switches mounted in a box under the cooking top.

Fuses covered by a hinged door.

All switches have a rotating pointer which travels over a switch plate stamped with white markings "Off," "High," "Medium" and "Low."

All switches are double pole, a new feature.

All switches are 20 ampere rating.

All heating units are removable.

Oven racks, glides and heat shields are removable, a distinct Westinghouse feature.

Oven heating units: Top unit of 800 watts capacity used for browning only.

Bottom unit is 2000 watts capacity and is used for baking, roasting and broiling.

Wiring of thermometer on Semi-Automatic range is carried through the door hinges. No wiring to change should door or thermometer be replaced.

Terminal box provided for conduit or open wire connection to service wires.

Connector body located on side of heater box for plugging in an Iron, Toaster or other electrical appliance.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
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CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill
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VANCOUVER, Bank of Ottawa Bldg

OTTAWA, Ahearn & Soper, Ltd
WINNIPEG, 158 Portage Ave. E
EDMONTON, 211 McLeod Bldg



A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

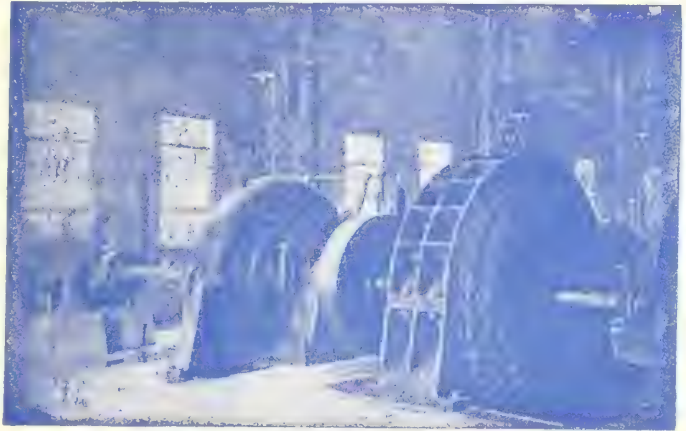
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto

"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723



We also manufacture Vulcanized Fibre and Continental-Bakelite in sheets, rods and tubes, and Continental in sheets or rolls from .005" to .020".

FOR BETTER INSULATION USE BAKELITE-DILECTO

Because BAKELITE-DILECTO has extraordinary dielectric and tensile strength; because it is hard and tough, yet readily machined.

BAKELITE-DILECTO is insoluble, infusible and chemically inert. It will satisfactorily replace rubber, mica and many other products, for insulating purposes or mechanical applications. It is manufactured in sheets, rods, tubes and special shapes.

You should have full information about BAKELITE-DILECTO. Write us to-day.

THE CONTINENTAL FIBRE CO.

NEWARK, DEL.

New York Office:
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Los Angeles Office 411 S. Main Street

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525 Market Street.

USED ELECTRIC MOTORS

IN STOCK APRIL 24th

550 Volts 3 Phase 60 Cycle

1	H.P.	1800	RPM.	Westg.
3	"	1800	"	C.-Wheeler
5	"	1800	"	A.C.B.
5	"	1200	"	C.G.E.
5	"	900	"	C.-Wheeler
7½	"	1800	"	Thomson
7½	"	1800	"	C.-Wheeler
7½	"	1200	"	Thomson
7½	"	1200	"	Ampere
7½	"	900	"	Westg.
10	"	1800	"	C.G.E.
10	"	900	"	C.-Wheeler
15	"	1200	"	C.G.E.

ALTERNATING CURRENT

15	"	1200	"	A.C.B.
20	"	1200	"	A.C.B.
20	"	1200	"	C.-Wheeler
25	"	1200	"	Westg.
25	"	900	"	C.G.E.
30	"	900	"	Fairbanks

550 Volts 3 Phase 60 Cycles

35	H.P.	900	RPM.	C.-Wheeler
50	"	900	"	A.C.B.
50	"	900	"	Westg.
75	"	900	"	Westg.
100	"	900	"	C.G.E.
300	"	720	"	Westg.

220 Volts 3 Phase, 60 Cycle

5	H.P.	1800	RPM.	Watson
7½	"	1800	"	A.C.B.
10	"	1200	"	S.G.E.
10	"	900	"	A.C.B.
75	"	900	"	Westg.
75	"	720	"	Westg.
100	"	720	"	Fairbanks

2200 Volts 3 Phase 60 Cycle

50	H.P.	1200	RPM.	A.C.B.
100	"	720	"	C.G.E.
200	"	514	"	C.-Wheeler

1—75 K.W. 2300 volts 60 cycles 3 phase 900 rpm. G.E. revolving field type generator.
1—250 K.W. 600 volt 60 cycle 2 phase 600 rpm. C.G.E. revolving field type generator

TRANSFORMERS
3—15 KV.A. 2200-550 volts 60 cycle C.G.E.
2—30 KV.A. 2200-220/110 volts 60 cycle Wagner
2—200 KV.A. 2200-220/110 volts 60 cycle Packard

110 VOLTS

6	H.P.	1850	RPM.	C.G.E.
6	KW.	1465	"	Westg.
8	H.P.	1200	"	Union
10	"	700	"	G.E.
11	"	700	"	Westg.

220 VOLTS

20	H.P.	925	RPM.	C.G.E.
50	"	950	"	Westg.
90	"	925	"	Westg.
100	"	650	"	Bullock

500 VOLTS

10	H.P.	1400	RPM.	A.C.B.
10	"	1400	"	C.G.E.
20	"	1400	"	Western
25	"	1500	"	Westg.
50	"	825	"	Westg.
60	"	900	"	Westg.

DIRECT CURRENT MOTORS AND GENERATORS

All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON Co., LIMITED

ELECTRICAL ENGINEERS
7-13 ST. GENEVIEVE STREET MONTREAL

HAVE YOU BENEFITTED?



Experience of the last few years has been very rich in its teaching of the value of flexibility in a distribution system.

Now that you have the opportunity to revise, balance, and rebuild circuits that were badly overloaded, why not guard against fixed limitations by using G & W POT-HEADS AND BOXES, which can be the basis of the greatest possible flexibility, both of operation and layout.

Build the flexibility in now.

G & W ELECTRIC SPECIALTY CO.
7440-52 So. Chicago Ave CHICAGO, U.S.A.

A. H. Winter-Joyner, Ltd., 62 Front St. W., Toronto.
A. H. Winter-Joyner, Ltd., 10 Cathcart Street Montreal.
Bentz-Richardson Co., Ltd., 592 Notre Dame Ave., Winnipeg.
General Supplies, Limited, Calgary and Edmonton.



Electrical

News

Engineering Contracting

Merchandising Transportation

MOLONEY TRANSFORMERS

Used throughout Canada and noted
for their efficiency and dependability.

Below are shown the type of transformer
furnished for outdoor service in all voltages
above 2,200 and in all sizes from 100 to 3,000
K.V.A. for either 25 or 60 cycle.

As in all our other transformers, the con-
struction, materials and workmanship
ensure a twenty-four service at the lowest
possible operating cost.



Single Phase
POWER
TRANSFORMER



3 Phase
POWER
TRANSFORMER

*Prices and catalogues
gladly sent on request.*

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.
District Offices Factory Head Sales Office

Montreal and Halifax Windsor, Ont. 1221-4 Bank of Hamilton Bldg. Toronto



The Beacon Signal
A Medieval method of
communication



Cab Tire Cable

Cab Tire Cable, as the name implies, is an electrical conductor, insulated and jacketed with a wear-proof vulcanized rubber compound very similar to that used for cab tires. It has no outer braid.

Cab Tire Cable will resist the action of steam, oil, acids or alkalis; is not affected by climatic or temperature changes; is light and flexible; will out-wear any braided cable.



Automobile Cable

Northern Electric Automobile Cables for ignition, lighting and starting circuits. The flexible conductors are insulated with an ample thickness of a high-class rubber compound. A varnished fabric tape and a varnished cotton braid protect the insulation from attack by oil and grease.

Largest Canadian Manufacturers of Bare and Insulated Wires and Cables

Northern Electric Company
LIMITED

Montreal
Halifax

Quebec
Ottawa

Toronto
Hamilton

London

Windsor
Winnipeg

Regina
Calgary

Edmonton
Vancouver

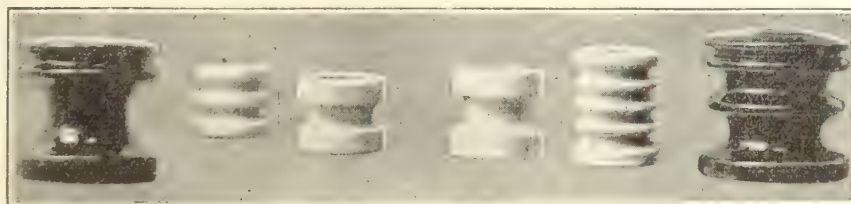
PORCELAIN

A Thomas Quality Group

IT'S one thing to use Insulators and yet another matter entirely to use **Thomas Quality Insulators.**

There is unquestionably a certain unconscious relief comes to the Engineer when installing Thomas products.

Although similar in general appearance, Thomas Insulators prove less expensive, but it is the Test of Time on the Line that brings out their true Distinctiveness.



Thomas Quality Distribution Insulators

This group of Thomas Insulators is a great favorite with the Construction Crew. The man on the job knows that Insulators bearing the Thomas mark are Dependable will stand rough handling, are easily installed and will function properly in service.

Jobbers and Contractor-Dealers

If you believe in uniformity in porcelain and would handle the best—Specify Thomas Insulators on your Secondary and Telephone Distributing Racks.

If, on the other hand, you assemble your own racks, buying Insulators direct, we suggest that you write us for samples and prices. If you would guarantee your assemblies—Buy-Porcelain-Right and Buy-Right-Porcelain.

Write to-day for a copy of the new Bulletin on this line of Insulators. It gives full data, dimensions and prices on Thomas Secondary Rack Insulators, Telephone Knobs and Spools and Porcelain Knobs for Fork-Bolts, Turnbuckles and Insulated Fittings.

Did you receive a copy of the new catalogue on Standard House and Industrial Wiring Porcelains? You had better write for it NOW.



Canadian Distributor

Northern Electric Company
LIMITED

Montreal	Ottawa	Windsor	Calgary
Halifax	Toronto	Winnipeg	Edmonton
Quebec	Hamilton	London	Regina
			Vancouver

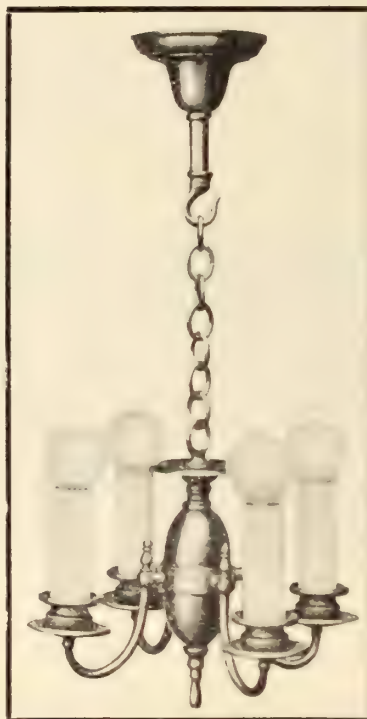
ELECTRIC FIXTURES

and

PORTABLE LAMPS



Semi-Indirect Fixtures
 Floor Lamps
 Shower Fixtures
 Hall Lights
 Combination Fixtures
 Electrical
 Glassware



Portable Table Lamps
 Domes
 Candle Fixtures
 Wall Brackets
 Commercial
 Lighting Units
 Electrical Sundries

Electrical Parts and Fittings, Electric Flash Lights, Toy Electric Trains,
 Electric Heating Appliances

Our new Catalogue contains 40 pages of popular priced Electric Fixtures in the newest designs; all stock numbers, wired complete, ready for rush shipment

WRITE US FOR A COPY

NERLICH & CO.

146-148 Front St. West

TORONTO



LOOMDUCT

Something new

A Canadian Product

The most flexible and durable non-metallic conduit made.

NON-COLLAPSIBLE

Its great strength and unusual flexibility are due to its single interwoven wall of Kraft Paper and high grade Cotton Yarn.

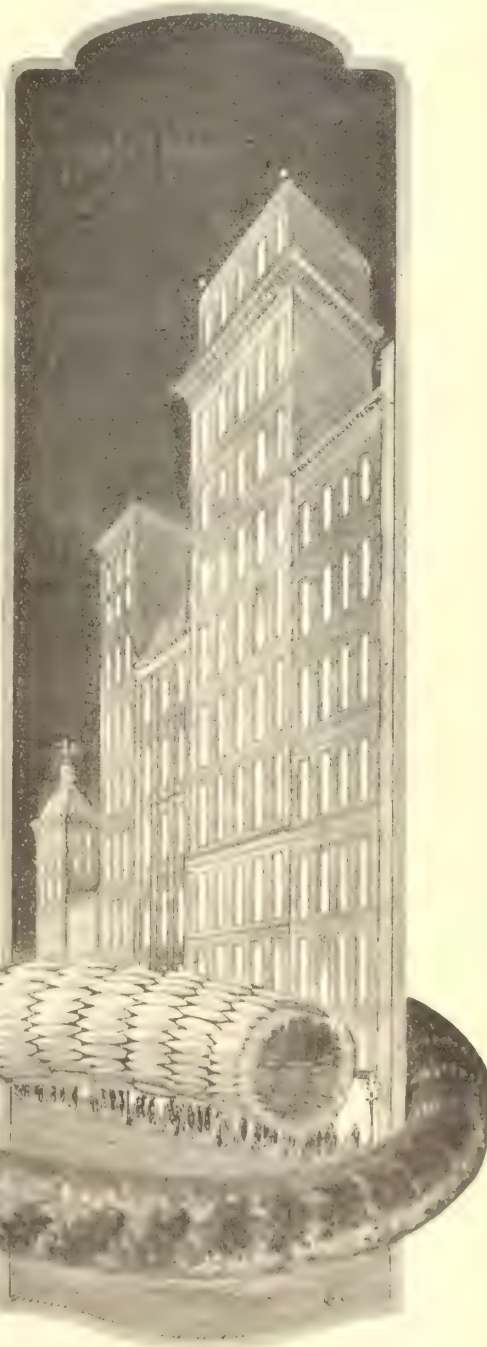
Fish A Coil

It is possible, owing to its interior resembling a roller bearing surface, to fish a greater length of "LOOMDUCT" than any other Canadian made conduit.

MANUFACTURED BY

The
L. & N. Company, Ltd.
St. Johns, Que.

Also manufacturers of "INSULADUCT", the most popular double wall conduit on the Canadian market.





Billing on a Measured Basis Means Satisfaction and Success

After the invoices for the current you have furnished are mailed to your customers, can you sit back and feel that every cent asked for is justified? Can you **know** that you have distributed **equitably** your costs of furnishing current—can you **know** that your customers with good load factors are not carrying the burden of other customers who are not using their power properly?

The fact that one company on your lines might have used **exactly** the same amount of energy (kw. hours) as another for a certain period does not mean that they should have been billed the same. You can only be sure of your billing if you measure each customer's maximum demand as well as his actual kw. hour consumption. 85% of every bill you render is based upon your fixed charges. Therefore, demand must be measured if 85% of each bill is to be correct.

The Lincoln Maximum Demand Meter measures demand—it is accurate, reliable and low priced. It operates on the thermal principle, proved throughout the Dominion. Write for Section II. (the Technical Section) of our catalog—now ready. It goes into all details of the Lincoln Meter and explains the advantages of measuring both demand and kw. hour consumption.

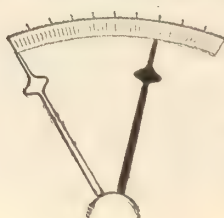
Lincoln Meter Co., Limited
243 College Street, Toronto, Canada
Cable "Meters" Toronto Phone College 1374



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

Lincoln
MAXIMUM DEMAND
meter

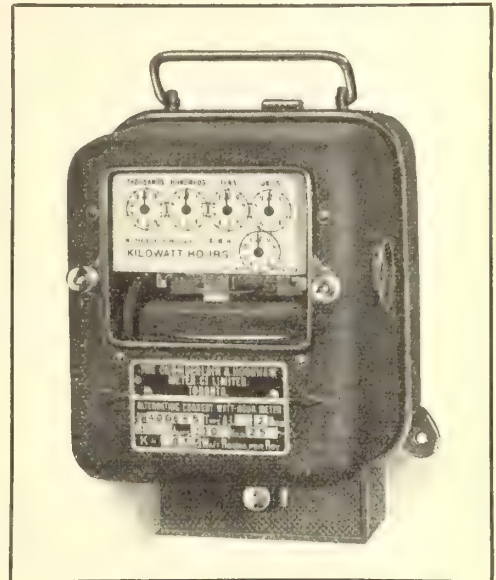


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World

USED ELECTRIC MOTORS

IN STOCK APRIL 24th

550 Volts 3 Phase 60 Cycle			
1 H.P.	1800 RPM.	Westg.	
3 "	1800 "	C.-Wheeler	
5 "	1800 "	A.C.B.	
5 "	1200 "	C.G.E.	
5 "	900 "	C.-Wheeler	
7 1/2 "	1800 "	Thomson	
7 1/2 "	1800 "	C.-Wheeler	
7 1/2 "	1200 "	Thomson	
7 1/2 "	1200 "	Ampere	
7 1/2 "	900 "	Westg.	
10 "	1800 "	C.G.E.	
10 "	900 "	C.-Wheeler	
15 "	1200 "	C.G.E.	

ALTERNATING CURRENT			
15 "	1200 "	A.C.B.	
20 "	1200 "	A.C.B.	
20 "	1200 "	C.-Wheeler	
25 "	1200 "	Westg.	
25 "	900 "	C.G.E.	
30 "	900 "	Fairbanks	

550 Volts 3 Phase 60 Cycles			
35 H.P.	900 RPM.	C.-Wheeler	
50 "	900 "	A.C.B.	
50 "	900 "	Westg.	
75 "	900 "	Westg.	
100 "	900 "	C.G.E.	
300 "	720 "	Westg.	

220 Volts 3 Phase, 60 Cycle			
5 H.P.	1800 RPM.	Watson	
7 1/2 "	1800 "	A.C.B.	
10 "	1200 "	S.G.E.	
10 "	900 "	A.C.B.	
75 "	900 "	Westg.	
75 "	720 "	Westg.	
100 "	720 "	Fairbanks	

2200 Volts 3 Phase 60 Cycle			
50 H.P.	1200 RPM.	A.C.B.	
100 "	720 "	C.G.E.	
200 "	514 "	C.-Wheeler	

1—75 K.W. 2300 volts 60 cycles 3 phase 900 rpm. G.E. revolving field type generator.
1—250 K.W. 600 volt 60 cycle 2 phase 600 rpm. C.G.E. revolving field type generator

TRANSFORMERS

3—15 KV.A. 2200-550 volts 60 cycle C.G.E.
2—30 KV.A. 2200-220/110 volts 60 cycle Wagner
2—200 KV.A. 2200-220/110 volts 60 cycle Packard

DIRECT CURRENT MOTORS AND GENERATORS

110 VOLTS			
6 H.P.	1850 RPM.	C.G.E.	
6 KW.	1465 "	Westg.	
8 H.P.	1200 "	Union	
10 "	700 "	G.E.	
11 "	700 "	Westg.	

220 VOLTS			
20 H.P.	925 RPM.	C.G.E.	
50 "	950 "	Westg.	
90 "	925 "	Westg.	
100 "	650 "	Bullock	

500 VOLTS			
10 H.P.	1000 RPM.	A.C.B.	
10 "	1400 "	C.G.E.	
20 "	1000 "	Western	
25 "	950 "	Westg.	
50 "	825 "	Westg.	
60 "	900 "	Westg.	

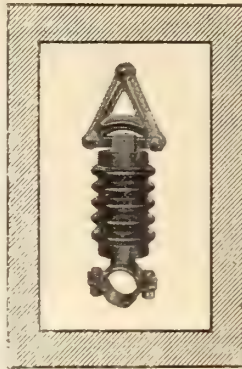
All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL



Logical

Where your requirements are such that—
A universal type of bus bar support is desired.
Where changes may occur.
When you want—

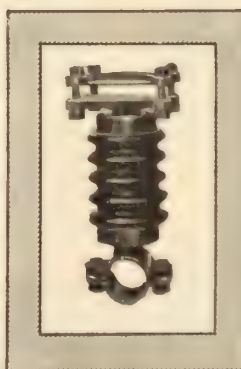
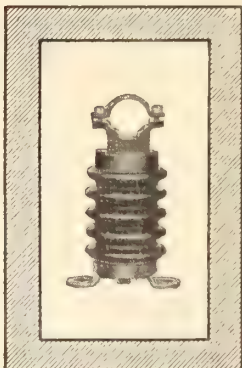
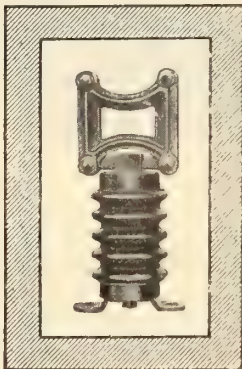
Safety
With Quality
With Changeability
With Adjustments

And at a moderate cost.

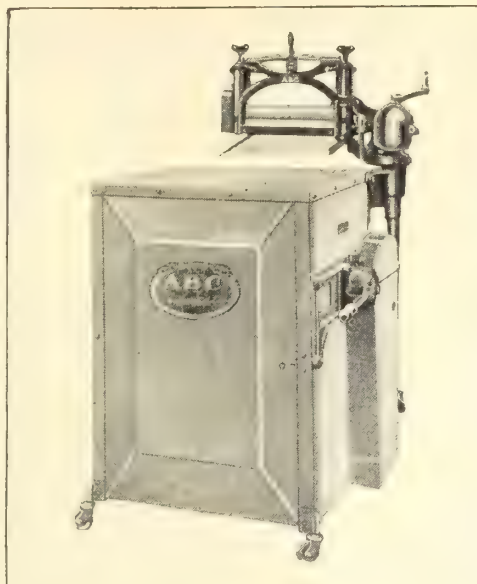
Then Specify

"FRANKLIN JUNIOR"

Our Bulletin No. 1000, fully picturing and describing "FRANKLIN JUNIOR", will be gladly sent upon request.



*The new improved
1922 model A B C*



*65E—Galvanized tub
66E—Heavy copper tub*

The Nearest to a Service-Proof Washer!

Twenty-four vital improvements, each the result of the years that A B C's have been in the hands of users, virtually eliminates all service on this new model A B C **Electric Laundress**.

Here is a washer which will greatly increase your net profit per sale, as well as thoroughly satisfy each purchaser, by the freedom from service calls that it makes possible.

Among its new perfections are a handsome aluminum all-metal wringer with two-spring tension and the surest safety release ever devised, an improved perfectly aligned wringer control assembly that is without equal, a positive wringer-locking device that locks automatically in twenty different positions—unparalleled for safety, machine-cut gears throughout, an improved one-piece threaded drain spout, a sediment drain groove in tub, nutmeg push

button switch, oversize pressed steel castors, one-piece non-warping snug-fitting lid, nickel-plated handles, a "cord tire" belt, malleable crank and oil grooves in main gear case bearings.

Full details concerning these and the other betterments are contained in a special folder which will be mailed on request.

Choice of galvanized or heavy copper tubs, maple or zinc cylinders, also is afforded.

In addition to this de luxe model, the widely-advertised A B C line includes open cabinet models, dolly-type washers and electric ironers, at a price range which covers every need.

A B C dealers receive a most comprehensive local merchandising service which is a great aid to sales.

Write to-day for our liberal proposition.

A B C *Electric Laundress*

ALTORFER BROS. COMPANY, Pioneer Makers of Power Washers and Ironers

PEORIA, ILLINOIS, U. S. A.

C. D. HENDERSON, Canadian Representative, Box 123, BRANTFORD, ONT.

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QUEBEC

Dawson & Co., Ltd.,
148 McGill St. - - - Montreal

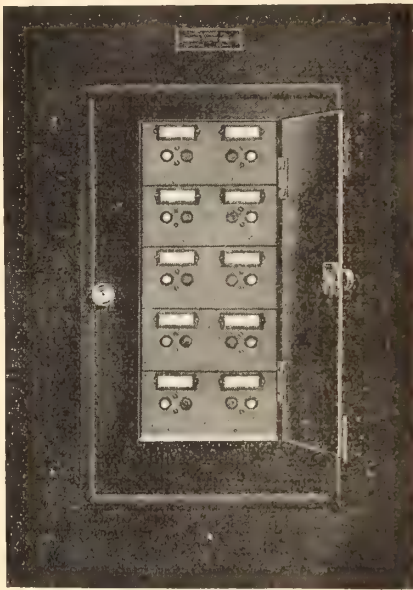
SASKATCHEWAN

Sun Electrical Supply, Ltd.,
Regina

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DEVOE - LATEST - SAFETY - PANELS



Our new catalogue, No. 9, describing the above panels, will be ready shortly for distribution.

Send us your specifications and we will quote you price.



THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame West, Montreal, and 105 Victoria St., Toronto, Ont.



Thor-32

The Choice Of Every Housewife

Your customers want the newest and most improved electric washing machine. They will select the most up-to-date model—the one with all the latest worthwhile features—Sell them the Thor 32.

Hurley Machine Co.,
Limited
Ryrie Bldg. Toronto

Galvaduct



A Galvaduct Building

New Plant—Canada Decaleomania Co., Ltd., Toronto, Ont.
Electrical Contractor—TORONTO ELECTRIC CO.

“GALVADUCT”

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

“LORICATED”

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Loricated

Always specify GALVADUCT or LORICATED CONDUITS

If your jobber cannot supply you—write us

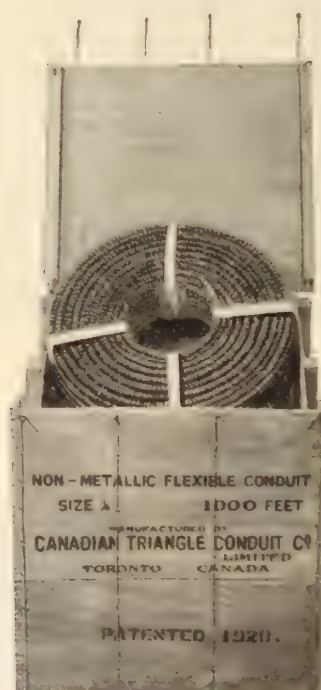
CONDUITS COMPANY LIMITED
TORONTO MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

WHY "TRIDUCT"?

Examine "TRIDUCT"—
Note Its Variance from the Ordinary Tube

Knitted
Single Wall
Non-Collapsible



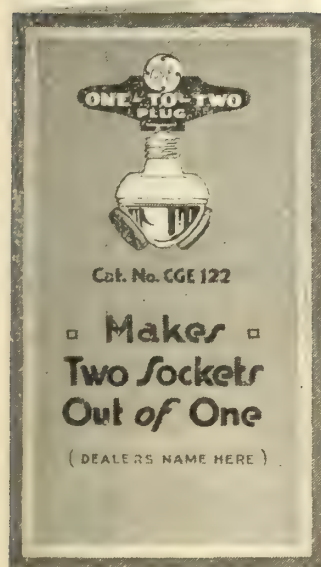
Flame proof
Greater Flexibility
Easily Fished

A "TRIANGLE" Product
"Packed and Shipped as a Quality Product Should Be"
Made In Canada

SELLING AGENTS
CONDUITS COMPANY LIMITED
33 Labatt Avenue - Toronto



Attract Attention - Arouse Interest - Stimulate Desire



The Three Functions of a Good Display

THE C. G. E. One-To-Two Plug, conforming to the C. G. E. merchandising policy of packing wiring devices in individual and artistically labelled cartons, is meeting with an enthusiastic reception everywhere.

C. G. E. Wiring Devices, with their distinctive orange and blue labels, practically sell themselves. For example, by dressing your window with One-To-Two Plugs you cannot help but develop an excellent display, which will have its effect on your cash register. The striking design of the carton showing the adaption of the plug, to one or more of its many uses, and the message that it makes "Two Plugs out of One" will attract attention—arouse interest and stimulate desire.

A supply of imprinted folders will be forwarded upon request.

Canadian General Electric Co., Limited




HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

BRUSH DATA SHEET

CANADIAN NATIONAL CARBON COMPANY, LIMITED

If you will furnish us with the following data it will enable our engineers to select a brush adapted to your machine.

1. Generation, Motor or Rotary Converter
2. Used for what service
3. Direct or Alternating current
4. Manufacturer
5. Type
6. Serial Number
7. Voltage
8. Rated Capacity in Amperes
9. Maximum Load
10. Duration of maximum load
11. Average Load
12. Revolutions per minute
13. Number of poles
14. Has the machine interpoles
15. APPROXIMATE DIAMETER of commutator or rings
16. Is the mica undercut in commutator slots?
17. State number of rings on machine
18. If collector rings Is material iron, steel, brass, bronze or copper
19. Are brushes carbon, graphite or metal graphite
20. Do brushes run trailing  Leading  Radial 

Information below to be filled in by user:

Per person, State, City, Province, Country, Date

Remarks

Date

Same Motor: *different work, different brushes*

**Columbia Data Sheet Service
Solves Your Brush Problems**

Write the address below.



Brush requirements vary with the application of the motor or generator. What is correct for a motor or generator in one case may be entirely wrong for the same motor or generator in another.

Only careful analysis of the service conditions will assure the best results from each unit. The investigation and analysis of these conditions is the function of Columbia Data Sheet Service.

At your request Columbia Brush Specialists

will examine your machines—each machine individually—and ascertain exact conditions of operating.

They pass these facts to our Board of Engineers, which analyzes the facts and specifies correct brushes for each machine. The Columbia Pyramid Brushes recommended are guaranteed to give satisfaction in service.

You are invited to avail yourself of this service. It is at your command, whether you have one unit or a thousand.

CANADIAN NATIONAL CARBON COMPANY, LIMITED

Toronto and Winnipeg

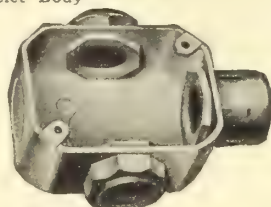
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY

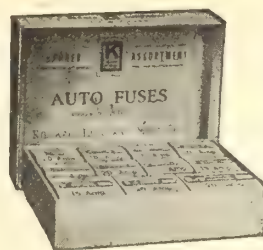
Canadian Sales Agents

HATHEWAY & KNOTT, Inc.

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment
"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

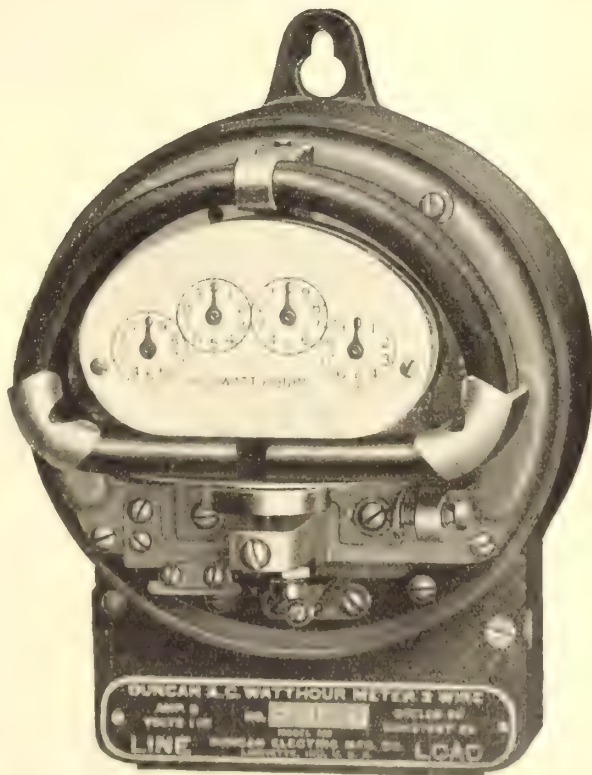
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FOR ALTERNATING CURRENT SERVICE

SUPERIORITY

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No other meter in use today shows the degree of accuracy on overloads as does the Duncan Model M2. Test this out for yourself. Its magnet is so satisfactory and dependable that it is looked upon as opening up a new era of design for permanency.



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Made Entirely of Metal —and Sells for \$150!

The Sunnysuds (the first standard size cabinet electric washer to retail at \$150) is built of steel, copper and aluminum. Wood is used only where good engineering dictates—the cross member on which the motor is mounted.

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Unusual dealer interest was created by the first announcement of this remarkable washer selling at a remarkable price. The Sunnysuds sales organization is being slowly and carefully expanded. Dealers who appreciate the profit possibilities in selling a standard size satisfaction-giving electric washer for \$150 are urged to write at once for complete information as to discounts, etc.

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Kitchener, Ontario

Retail price \$150.⁰⁰

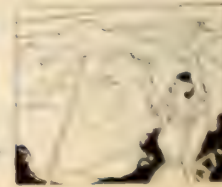
West of Winnipeg \$165.00

Don't fail to see the Sunnysuds demonstrated in the Electrical Building at the Toronto Exhibition.

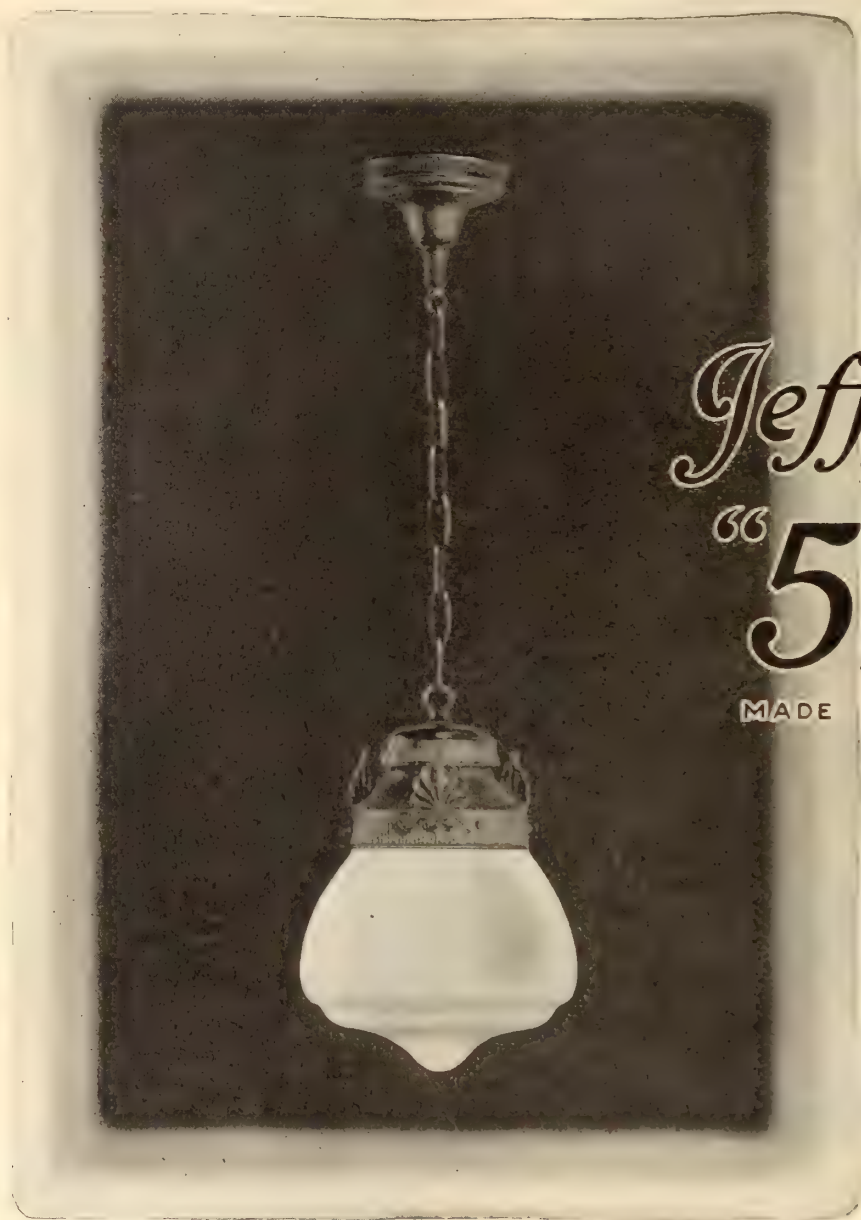


Sunnysuds

Electric Washer & Wringer







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 "515"

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A Pleasing Deviation From the Ball Globe

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo glass, with standard 6" fitter.

Adaptable for any business lighting.

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The following Books are Offered Subject to Previous Sale:

- A Laboratory Manual of Alternating Currents, by John H. Morecroft, E.C. Published in 1912 by Renouf Publishing Company. 248 pages, illustrated. Price \$1.50.
- Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price \$2.50.
- Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price \$2.50.
- Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, published in 1917 by McGraw-Hill Co., Inc. 285 pages, illustrated. Price \$2.50.
- Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price 50c.
- Electric Railway, by A. Morris Buck, M.E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated.
- "Engineering Electricity," by Ralph G. Hudson, S.B., 190 pages illustrated. Published in 1920 by the John Wiley & Sons, Incorporated. Price \$2.00.
- Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price \$1.50.
- Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price \$3.00.
- "How to Sell Electrical Labor-Saving Appliances," by Electrical Merchandising, first edition, 115 pages, illustrated. Published in 1918 by McGraw-Hill Book Company, Inc. Price \$1.00.
- Practical Electric Illumination, by Terrell Croft. First edition, published in 1917 by the McGraw-Hill Book Co. 225 pages, illustrated. Price \$2.00.
- Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price \$4.50.

- Principles of Electrical Design—D.C. and A.C. Generators, by Alfred Still. Published in 1916 by McGraw-Hill Book Co. 365 pages, illustrated. Price \$3.00.
- Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price \$2.00.
- Radiation, Light and Illumination, by Steinmetz. Published in 1909 by McGraw-Hill Book Company. 304 pages, illustrated. Price \$2.00.
- "Storage Batteries," by C. J. Hawkes, 157 pages, illustrated, published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.
- Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Published in 1917 by Longmans-Greene & Co. 102 pages. Price \$1.00.
- Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.
- "Theory and Calculation of Transient Electric Phenomena and Oscillations," by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.
- The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.
- The School of Practical Electricity (Electrician's Course in 2 volumes. Volume I. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.
- The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 50c.

ELECTRICAL NEWS,

347 Adelaide St. W., Toronto, Ontario

Eureka Dealers Study Their Sales Records——and Smile

EUREKA dealers all make money—make it month after month because the demand for Eureka's never changes. Here are two reasons for Eureka's continuous popularity:

Eureka is extensively advertised in the leading women's magazines.

Eureka is a grand prize cleaner at a reasonable price. It sells for \$5 to \$15 less than other cleaners because of its superior design and because the Eureka factory capacity is 1,000 machines a day.

Our comprehensive sales co-operation and generous discounts make a Eureka representation permanently profitable.

We have some open territory waiting for aggressive, able dealers—electrical contractors and dealers, hardware and department stores, etc. One of our representatives is stationed near you. He will call if you write or wire us.

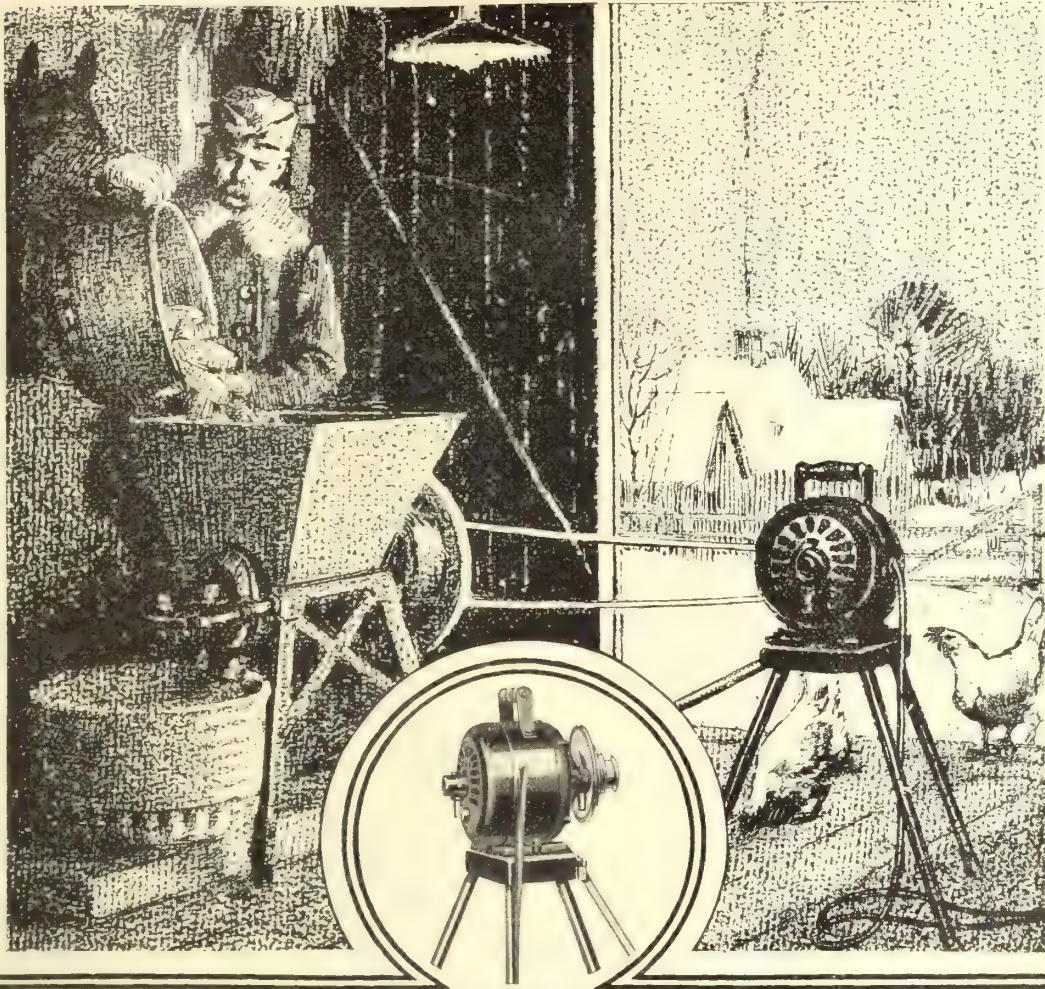


EUREKA VACUUM CLEANER COMPANY, KITCHENFR, ONT.

EUREKA

*Draws the
Air Clear Through*

*Don't fail to see demonstration of Eureka Vacuum Cleaners
in Electrical Building at Toronto Exhibition.*



THE extension of central station circuits into rural districts and the development of the farm isolated plant industry, has opened a tremendous field for the use of portable motors suitable for driving the various small machines about the farm and farm home. As the pioneer manufacturer of these portable motor outfits, The Robbins & Myers Company has gained an experience which, embodied in the R & M Power Stand Motor, has won leadership for this motor throughout the farm field. It is made for operation on single phase A. C. circuits or low voltage D. C. circuits.

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BRANTFORD, ONTARIO

Robbins & Myers Motors



Every dealer who handles Hotpoint Irons has another chance to ginger up his trade and make friends for his store

3 Hotpoint Days for the 3 Hotpoint Irons

On Friday, September 16th, Saturday, September 17th, and Monday, September 19th, the trade will sell the 6 lb. and 3 lb. iron for \$5.00 (50c higher in Alberta and British Columbia), and the Boudoir Set for \$7.25 (25c higher in Alberta and British Columbia).

We make you special low prices. You buy as many as you want, selling at regular prices except on these three days.

A big newspaper Campaign in all the larger centres backed up by your own window displays, etc., will make this September sale a big success.

Write at once for full details about the Campaign, also window display contest (\$200.00 in prizes).

Canadian Edison Appliance Co., Limited
Stratford, Canada



Hole's Lighthouse

The Superior Luminous Pendant

"Most Attractive in Daylight—
Most Brilliant at Night"

This article contains an actual quantity of real radium; is unbreakable and is guaranteed to retain its original luminosity for five years.

Send now for your supply—They will sell!
Splendid display features and liberal discounts!

Prices: To the dealer, \$1.80 per dozen mounted on attractive display card. \$21.00 per gross. Checks payable in American funds only. Cash with order 3% off.

HOLE'S LIGHTHOUSE, 6907 Jeffrey Ave., Chicago, Ill



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Copper, Brass and Bronze Wire.
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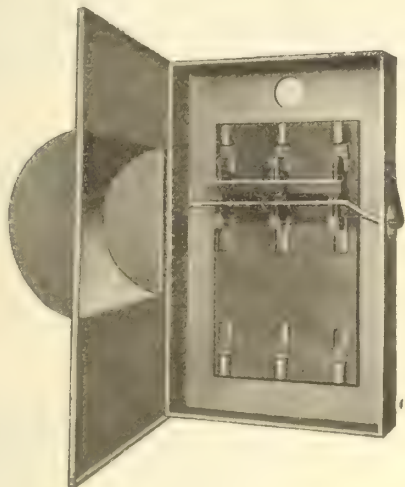
Cable Terminals, Junction Boxes, etc.

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Standard Underground Cable Co.
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Dominion Steel Enclosed Switches are designed for use in connection with service and industrial installations wherever it is desirable to completely enclose all terminal wires and live parts for the advancement of "Safety First" principles, standardization of equipment, the prevention of tampering with circuits and the elimination of accident hazards.

Our catalogue gives full description and prices of our complete line. Send for it.

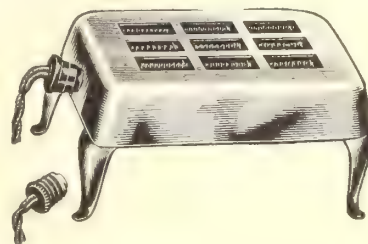
Makers of all types of steel boxes and tanks, also metal stampings, commercial welding and japaing.

DOMINION ELECTRIC SWITCHBOX CO.
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—Electric—

HEATER and COOKER



What It Is

An electrical appliance made from cold rolled steel, nickel plated. It is seamless, well constructed and guaranteed for one year. Equipped with eight feet of cord and detachable plug. The "Red Hot" Heater is approved by the Hydro Electric Power Commission of Ontario, approval No. 33.

What It Does

As a cooker, it will toast, bake, boil or fry. As a heater it will serve the purpose as quickly and efficiently as any other expensive appliances that can only be used for the one purpose. Already used in Hotels, Homes, Restaurants, etc. An all the year round seller.

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Electrical Appliances, Ltd.
Hamilton, Ont.



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Let us tell you why.

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LONGER LIFE AND HOTTER SPARK THAN FOUND IN OTHER BATTERIES



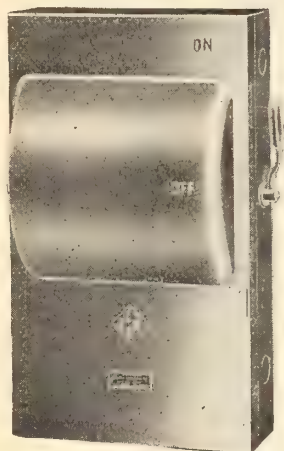
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Every battery bearing the North Star label is guaranteed to give full satisfaction to the consumer.

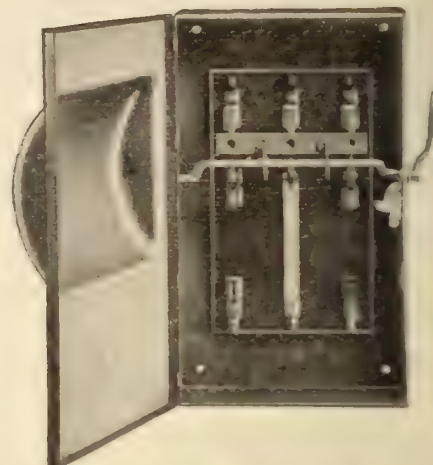
Should the battery prove defective, simply satisfy the merchant from whom purchased. He is authorized to replace it.

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to your job by
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LANGLEY EXTERNALLY OPERATED SWITCHES

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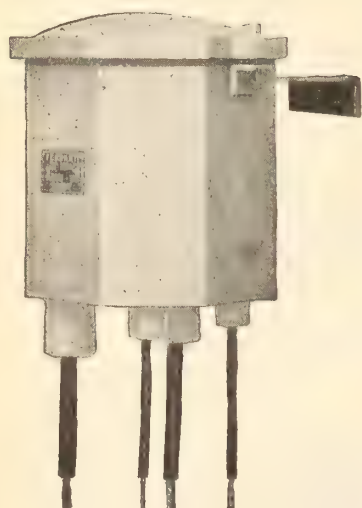
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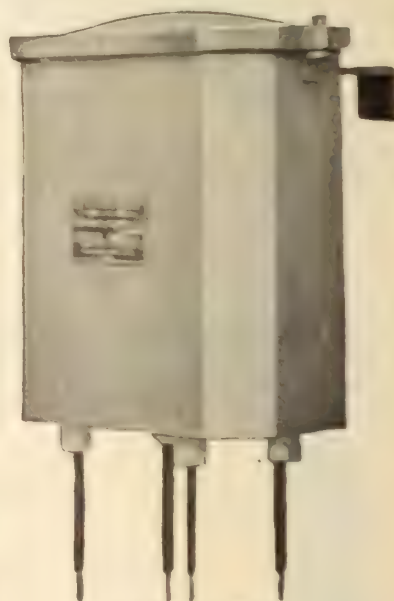
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TYPE "GW" Cross-Arm Mounting. Weatherproof. Circuit up to 4400 volts. Rating 50 Volt Amperes.

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Bought on a basis of tangible fact

Engineers used to buy O-B Insulators on faith
—faith in their own ability to judge good design
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Their trust has been fully justified by the records
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Time on the line is the only complete and final
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good under all conditions and in all services.

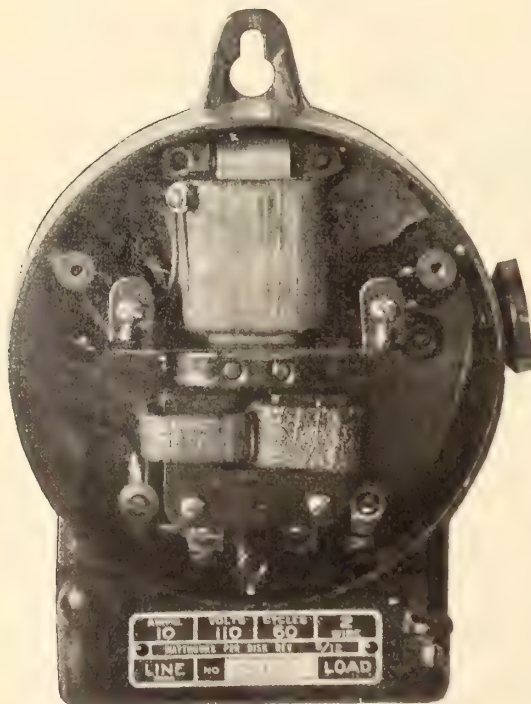
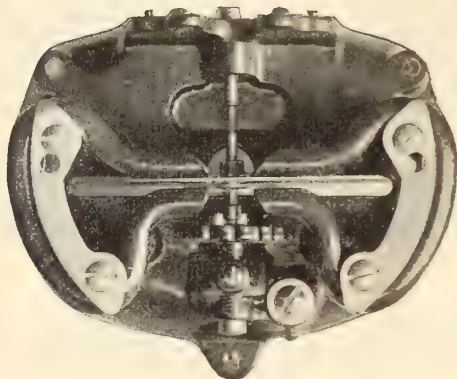
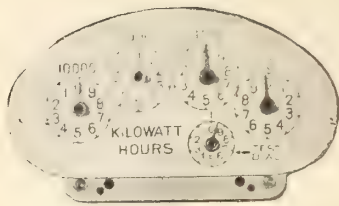
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most types.*

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Products: High Tension Porcelain Insulators; Trolley Material; Rail Bonds; Electric Railway Car
Equipment; Third Rail Insulators.

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SIMPLICITY of ADJUSTMENT

The Potential Coil is built on the core and is removed and replaced as a unit.

The Current and Potential Coils can be changed without dismantling the moving elements.

As all parts are dowelled and accurately made, faulty assembly or variations in the air gap is impossible.

Both the full load and light load adjustments are controlled by graduated screws, easily accessible when the meter cover is removed.

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For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By

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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31

Toronto, August 15, 1921

No. 16

Whether Private or Municipal, we Must Pay for the Service Rendered.

It is practically determined that the street railway fares in Toronto, after Sept. 1—when the city takes the system over at the expiration of the franchise—will be four for a quarter—6.25 cents a ride. There will be no special rates for working men, Sundays, etc.—only for children.

This compares with an average rate of 3.9 cents as collected in the year 1919 by the Toronto Railway Company. The city also received from the company in that year a lump sum payment of \$1,152,515., equivalent to approximately 0.6 cents per passenger carried, making the actual fare received by the company 3.3 cents.

There are those who will say "That's private ownership for you," but a moment's consideration will show that this is not a matter of private or public ownership at all. In the main, there are two methods of operating an electric railway system—(1) Fix the fare first and then give as much service as that fare will buy or (2) Establish a standard of service and then fix the fare at a figure that will maintain this standard.

There are an almost infinite number of gradations between these two extremes, of course, but before anyone starts out to criticize either the Toronto Railway Co for their past service, or the Toronto Transportation Commission for their forecasts of the future fare, it is necessary to understand that the private company represented the one extreme and the Transportation Commission will represent the other. That is,

the Toronto Railway Company have been tied down to a fixed fare—a sum that represented the price of a street car ride twenty-five years ago and which they have frequently claimed has not, in recent years, enabled them to give as good a service as might have been given for a larger fare. The Toronto Transportation Commission, on the other hand, have gone about the work of establishing a greatly improved service. They have done this on the definite instructions of the citizens who, of course, realized just as clearly as the Commissioners themselves did, that better service means heavier expenditure and dearer fares.

* * *

There is only one possible point for discussion about the whole matter, and that is—would the private company, in days gone by, have agreed to a fare and have tied themselves up to a standard of service that would have meant a better bargain for the citizens than they have in prospect on Sept. 1. This point, however, can never be positively cleared up. It is very probable that the Toronto Railway Company would have renewed their franchise for a lower rate than 6-1/4 cents—possibly five cents—and have tied themselves up to give a first class service. We believe they would have done so. Our politicians at the city hall would have none of it, however. The citizens of Toronto after, apparently, careful and deliberate study and thought decided against private ownership at any price and in favor of public ownership at whatever it may cost. They have no right to complain to-day when they are confronted with a substantially higher fare. They have no proof that the private company could have given them better service for the same money. It is too late to say they only want five cents worth of service. The 6-1/4 cent package is wrapped up and they will pay the price loyally and cheerfully if they are good sports.

Many Letters Express Approval of the Idea of Fusing the Two Existing Associations

Halifax, N. S. July 29th, 1921.

Editor, Electrical News.

I notice an editorial in your issue of July 15th headed, "Is it not time our two Central Station Associations cease duplication of effort?" in which I most heartily concur.

As you probably know, an electrical association has recently been organized in the province of Nova Scotia, and as one of the members, it is my ambition that this association should not only be extended to other parts of the Maritime Provinces, but that it should embrace all those interested in the electrical industry in the Maritime Provinces, whether engaged by municipalities or private organizations, in order that from the outset in these provinces we may have no duplication such as now exists in Ontario.

As I see the situation here, there is no essential conflict between private and municipal interests, although as a matter of fact in the majority of the small communities in the Maritime Provinces, the electric utilities are in the hands of the municipalities direct.

Yours very truly,

K. H. Smith,

Chief Engineer, Nova Scotia Power Commission.

Winnipeg, 14th August, 1921.

Editor, Electrical News.

I was interested in reading the editorial on the front page of your issue of 15th July. Every word of the editorial I think is apropos to the subject and I heartily endorse the suggestions set forth therein. My own personal opinion concerning this matter is that the divided interests, or rather the fact that there is not one amalgamation of all electrical in-

terests in the country, is largely responsible for the lukewarm interest that many prominent men of the electrical game have shown in matters that should be their direct concern. As long as the present condition exists we will not have an electrical organization that is worthy of the electrical industry.

The fact that your July issue is late is of no moment compared to the necessity of your winning the strike. Winnipeg had a close shave in connection with the strike a couple of years ago; in fact we are not likely to forget that experience for a long time and we realize now, perhaps better than we did at the time, how important it was to win the fight.

Yours faithfully,
J. G. Glassco,
Manager, Hydro-electric System.

Toronto, Ont.

Editor, Electrical News.

I have read your editorial in July 15 issue, regarding the advisability of amalgamating the Association of Municipal Electrical Utilities Convention and the Canadian Electrical Association's Convention. I assure you that from a manufacturers' standpoint we would be very pleased to see this amalgamation take place. It would, as you point out in your article, eliminate duplicating a great deal of the work which is carried on at these conventions, and would, I think, ultimately be the result of having better conventions. A three day convention could then be turned into a four or five day convention, and it would then not be necessary to crowd the programme into such space as is generally the case. Personally, I cannot see why privately owned companies should object to holding a joint convention with the Public Utilities, or vice versa.

Yours very truly,
Moloney Electric Co. of Canada, Ltd.,
Geo. D. Leacock,
Sales Manager.

Mayor Parnell before Manitoba Association

Five outstanding civic issues—unemployment, the Mall, taxation, the street railway and the Greater Winnipeg Water District Railway—were concisely and ably reviewed by his Worship Mayor Parnell in an address which he gave to the members of the Manitoba Electrical Association on Thursday noon, July 21st.

Dealing first with unemployment, the Mayor told of the successful efforts made last winter and spring to meet the situation, mentioning that the city had spent \$65,000.00 in ameliorating conditions. Under the heading of Taxation he spoke of the city's commitments for the current year, showing that the city's expenditure this year would be \$8,582,000.00, as against \$5,203,000.00 in 1916. He stated that the tax rate in Winnipeg was too high, but the problem of bringing it down was very difficult of solution.

Referring to the Water District Railway, he mentioned that he had made at very great pains an exhaustive study, resulting in a report in which he recommended that the road be maintained and given a chance to operate under normal conditions. He said it would be a business blunder, a mistake and a most fatal thing to abandon the road right now, in spite of the fact that there was a deficit in operation of \$54,000.00 for 1920. He appealed to the association to study the report and express their opinion upon it.

His Worship went at length into the proposed Mall scheme, stating that if the present plan for a straight Mall scheme goes through Winnipeg would possess a Mall which would serve for all-time to come as a monument to the memory of the men

Province of Quebec Number September Fifteenth

The Province of Quebec Number of the "Electrical News", which was announced to appear June 15 last, was postponed on account of the printers' strike.

Operating on the open-shop principle, our plant is now sufficiently manned that we feel we can undertake the work on this important number. Accordingly it will be brought out September 15th.

The contents of this number will be of unusual interest and we have no hesitation in saying that it will be a very excellent issue. It will replace the regular September 15th. issue.

who fell in Flanders Fields and other theatres of war—something to be proud of for generations to come.

Coming to the street railway situation, the Mayor stated that he had all along urged in favor of the policy of negotiations between the city and the street railway company instead of litigation. There had been considerable negotiations, and he gave credit to both the street railway and the civic authorities for honestly trying to bring about a solution of the question. The street railway company, he said, had played the game and he was happy to say that the whole question was now not very far from settlement.

The Mayor closed with a very impassioned appeal to those present to assert themselves in civic politics, take an interest in community activities and keep their fingers on the pulse of civic affairs. He held before them the ideal of service, and said that the sum and substance of his whole experience as a public man was that one would get out of life just as much as one put into it.

The speaker was warmly applauded and thanked at the close, and as a result of his address the Manitoba Electrical Association will form a Civic Problems Committee through which the association will be able to yield a big influence in municipal affairs in Winnipeg.

During the luncheon Fred Pratt, chairman of the Entertainment Committee, read a financial report on the picnic, which, it is pleasing to say, showed a very good bank balance.

French Railway Places Order

An order for electrical equipment amounting to \$1,200,000 has been received by the Westinghouse Electric International Company from the Midi Railway of France. The order includes transformers, synchronous condensers, lightning arresters and other substation equipment. The Midi Railway operates an extensive system starting from Bordeaux, running through Toulouse to Cette, with many branches. The section on which the Westinghouse equipment will be used extends from Pau to Toulouse in the Pyrenees Mountains near the Spanish border. The line passes through Tarbes and St. Gaudens, and has a total length of over 100 miles.

Increased telephone rates in the province of Manitoba, ranging from 26-2/3 to 38-1/3 per cent in the city of Winnipeg and from 33 to 160 per cent in towns and rural districts has been granted by the Public Utilities Commission. The increase will be effective August 1st.

Mr. L. Silverman, Winnipeg, has secured the contract for electrical work on a school to be erected at St. Vital, Man.

Location of Switches on Heating Devices

Winnipeg, July 22, 1921.

Editor, Electrical News.

As the official having charge of all inspection of wiring and the approval of appliances in this City, which by the way enjoys the advantages of a 1c. per kw. h. rate for cooking and heating loads, we have been forced to deal intensively with the subject of inspection and regulation of these loads owing largely to the great activity in that line. For instance there are over six thousand electric ranges within the city limits.

In carrying out this work we have repeatedly run up against the problem of unsatisfactory performance of various types of switches of the rotary heater type mounted by manufacturers of various devices on the appliances. The latest subject dealt with has been exhaustively studied by the Underwriters' Laboratories to whom we are indebted for a good deal of research work in this direction. Mr. Dana Pierce, the vice-president in his summing up of the whole case presents arguments that I think should be widely disseminated so that manufacturers of appliances may, I trust, be guided by the suggestions he offers.

I would therefore be much obliged if you could see your way clear to publish the enclosed extracts from his letter.

Yours truly,

F. A. Cambridge,

Underwriters' Laboratories, New York, N. Y.

Subject: Heater Switches.

Mr. F. A. Cambridge,
City Electrician,
Winnipeg, Manitoba.

1. We have given very careful attention to your recent letters about — Co's. Heater Switches and have conferred at length with the manufacturer.

2. Our answer to your inquiries may be divided into four parts somewhat as follows:—

3. Apparently, these switches and perhaps some of the other makes were applied to a heater without very much consideration of the temperatures to which they would be subjected. The fact that a switch is called a heater switch by us or by its manufacturers should not necessarily imply that it can be indiscriminately used without any regard whatsoever to the temperatures to which it may be subjected. Steel springs, brass and bronze parts, insulating materials, and the necessary lubricant of the switch are all affected by heat. The designer of the heater should certainly share with the manufacturer of the heater switch the responsibility for the proper application of the latter if only for the reason that the switch maker cannot possibly make a switch which will continue to work satisfactorily when very hot. We notice, for instance, that in samples which you sent us some of the steel parts are actually blue with the heat and the insulating material badly charred and we do not know how to suggest improvements in materials which would meet conditions of such high temperatures. The manufacturers of ranges have pretty generally learned this lesson and accommodate their designs accordingly. One very simple way by which a good deal of protection to the switch could be secured would be an air space between it and the hot surface of the heating device. There are some fairly close fits especially in the shaft of the switch which cannot be increased without making the switch wobble and such parts require lubricant for proper operation. This is the first part of our answer which suggests the general question whether the heater manufacturers had done their share in securing correct conditions for the switches.

7. Regarding the flashing of the switch and the area of con-

tact, we believe these are all right. You will appreciate that a 20-ampere 120-volt switch has to control something like 3 h.p. or so; of course, there is a flash. The area of contact, we believe to be adequate as it has been tested repeatedly by the manufacturer and in course of our regular label service inspections. There is nothing on which it is more difficult to form a judgment than of the adequacy of the contact area in a switch. It simply cannot be judged by sight or theory. It, however, works or it does not and much depends upon the pressure of the blades, rapidity of motion, and the like.

8. Referring to your letter of 14th, these switches are insulated with Bakelite-Dilecto and, to tell the truth we know of nothing better that we can suggest. Mica is wholly impracticable because it will shatter under the blows of the switch. The Bakelite will stand as much temperature as should be applied to the springs and metal parts of the switch.

10. Lastly, we are told by the — Company that it is conducting a series of experiments on its own account to determine still further the effects of high temperatures on switches, such as those under discussion with reference to the metal, the cover linings, and the insulation. It hopes from these investigations to be able to introduce still further improvements in heater switches but does not expect to produce switches which can be successfully used when so installed that they get very hot and remain so for a long period of time. We ourselves are not inclined to believe that such a result can be attained with materials which must be used for snap switches.

(Signed) Dana Pierce.

Practical Man for Ontario Hydro Commission

Mr. Fred R. Miller has been appointed by the Ontario government to succeed the Hon. I. B. Lucas as member of the Hydro-electric Power Commission of Ontario. Mr. Miller is vice-president of Roger Miller & Sons, general contractors, Toronto, a firm well known throughout Canada as having carried out some of the largest Government contracts, prin-



Mr. Fred R. Miller

cipally on harbor work. At the present time they are engaged on completing a contract for the Dominion Government on the Toronto harbor improvement scheme. Mr. Miller's abilities as an administrator were recognized some months ago by the city of Toronto when he was appointed a member of the Toronto Transportation Commission.

Modern Switching Equipment

By L. B. CHUBBUCK, Engineer, Canadian Westinghouse Co.*

This is a broad subject, involving not only the design of the general station detail apparatus, but also the operating scheme of any particular system, to ensure the correct application of this detail apparatus.

In the electrical design of a modern station it is now customary to make up charts showing the short circuit currents and forces possible for various combinations of generators, feeders, bus reactors, etc. To segregate trouble and lessen the cost of oil switches, bus supports, etc., a separate or unit operation of the generators, transformers and lines is preferable. But after a complete study of the possible operating conditions it is usually found that some parallel operation, both high tension and low tension, may be necessary under certain conditions, and switching equipment must be provided of sufficient capacity for such service.

The relay system to be used in the station is also a factor in the capacity of oil switches required. In some cases operating conditions will permit the use of definite time limit relays to delay the tripping of a breaker until the short circuit current has dropped considerably below the maximum value. In another method, short time, high setting overload relays are used with bus breakers, to sectionalize the station or system, so that the particular breaker finally clearing the short, will

recent installation nearly 700 pounds per foot of bus, with buses on 4 ft. centers. Where a circuit is looped through an oil switch these forces may be the limiting factor in the switch capacity, rather than the ordinarily understood rupturing capacity at the time of opening. In large oil switches particularly, provision must be made to prevent detortion of terminals, contacts, etc. under such forces.

Referring again to relay systems as applied to oil switches, it is important to have a system that will disconnect only the feeder, etc., that may be in trouble. In the older plants, overload relays were used generously and in case of trouble at one point a number of breakers were tripped unnecessarily, dropping con

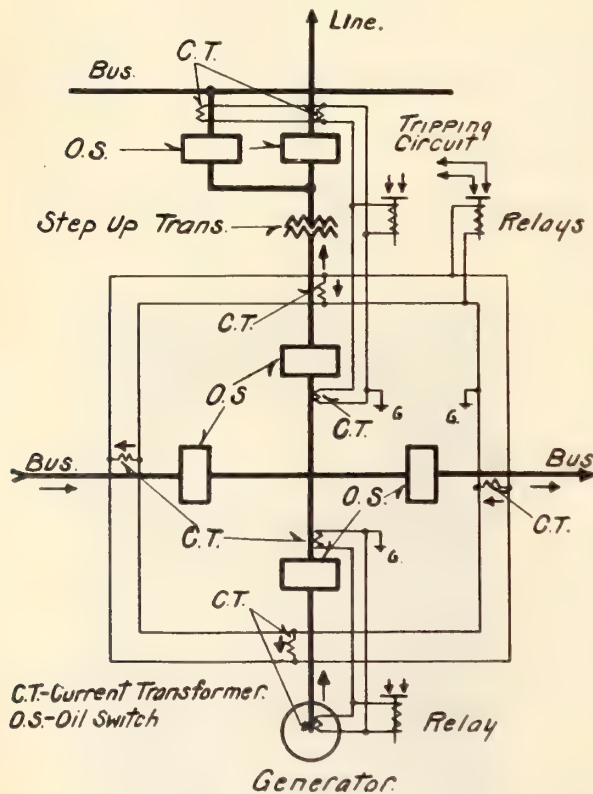


Fig. 1. Typical balanced relay protection

do this with a comparatively small amount of synchronous machinery behind it.

While such relay methods as these reduce the duty on the switch at the time of opening, yet the switch, while still in the closed position is subject to electro-magnetic forces, due to the high short circuit current for the first few cycles after the short occurs. These forces may reach very high values; in one



Fig. 2. Modern medium capacity oil Circuit Breaker

siderable load, and causing trouble in operation. While this was partly due to old types of unreliable relays, yet the recent tendency is away from overload relays in series, and towards balanced relay protection. With this latter method any breaker is positively non-automatic unless trouble develops in the unit it controls. Starting with the generators balanced relay protection is used to open the generator oil switch and field switch, only in case of trouble in that machine. There are instances where, with this method, the switches have been opened so promptly that some difficulty was experienced in locating the insulation breakdown.

While over voltage relays, etc. may also be used, yet the balanced relay system is depended upon for serious internal trouble. The ordinary indicating instruments give the operator the load condition on the generator and if thermo-couples are used throughout the winding an excellent indication is obtained of the machine. Balanced relay protection provides the simplest and best protection for a transformer bank, though care must

*Summary of talk recently given before the C. E. A. Quebec Convention.

be taken to use high tension and low tension current transformers, with suitable load curves. Otherwise in case of external trouble the difference in secondary currents may be sufficient to operate the transformer bank relays. In some cases the H.T. and L.T. current transformers are mounted directly on their respective power transformer bushings, giving a cheap and compact installation. In a similar manner balanced relay protection may be used to disconnect either a L.T. or H.T. bus section in case of trouble in the section. Fig. 1 shows a single line diagram of a typical balanced relay system ap-

gether with all mechanism, are mounted as a rigid unit on two horizontal 10 in. channels. Tanks and covers are designed to withstand internal gas pressures of over 1,000 lbs. per square inch. 80,000 volt test condenser bushings are used. These being short, and of large diameter (6 in.), have high cantilever strength to withstand electro mechanical forces. No porcelain or other brittle insulation is used. The main contacts are "reverse" brush type; both these and auxiliary contacts are designed to maintain contact under heavy short circuit currents. The auxiliary contacts are necessarily large to successfully shunt the large rated current (60,000 amps.) from the main contacts on opening. High speed solenoid operation is used, though a removable worm gear device is furnished for hand operation when desired. A worm gear device is also used for lifting or dropping the tanks. This device can also be used for replacing a complete tank unit, if necessary.

In contrast to the above medium voltage, high current breaker, it is interesting to compare the high voltage breaker shown in Fig. 4. This figure shows the breaker under construction in the factory, without tanks, indicating the internal arrangement. In such a breaker the possible abnormal voltages demand very large tanks for insulation requirements. While the tank structures are not subjected to as high pressures in

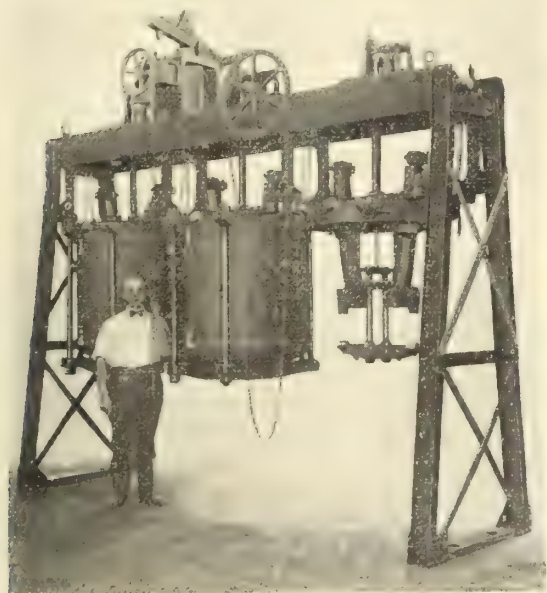


Fig. 3. 3,000 amp., 15,000 volt type "C-4" Circuit Breaker

plied to a network. The relay is unaffected by direction of the main currents provided the amount of power leaving the network is the same as that entering. Trouble inside the network will alter this balance, and all four breakers will be tripped open.

With such a system used throughout a station there is non-interference from external trouble and prompt isolation of internal trouble before any synchronous load is dropped.

While there are necessarily many types of oil switches to meet different conditions of voltage, current, breaking capacity, etc.; the oil breaker shown in Fig. 2 illustrates the main features required in modern design. In addition to a high factor of safety in both voltage and current tests, the mechanical design must permit mounting the various poles on a unit frame, to allow accurate alignment of the mechanism and contacts. Soapstone, etc., has been discarded, and all parts subject to pressure are of steel. Where space permits, for heavy service, round tank construction is used, as this has proved much superior to elliptical tanks with flat bottoms. Gravity opening assisted by a strong throw out spring is recommended, and it is important to have main and auxiliary contacts well submerged, and opening under a good head of oil. Flame proof insulating tank linings have been developed and will shortly be furnished as standard equipment. Provision must be made for ready inspection and adjustment of main and auxiliary contacts **under operating conditions**, i.e., without having to remove any of these parts for this purpose. In breakers up to 70,000 volts this inspection can be done by dropping the tanks, by a tank lifter or a winch device. In breakers above this voltage the tanks are sufficiently large so that access to contacts may be made through a manhole in the cover.

The breaker shown in Fig. 3 illustrates the heaviest medium voltage breaker so far manufactured. The three poles, to-

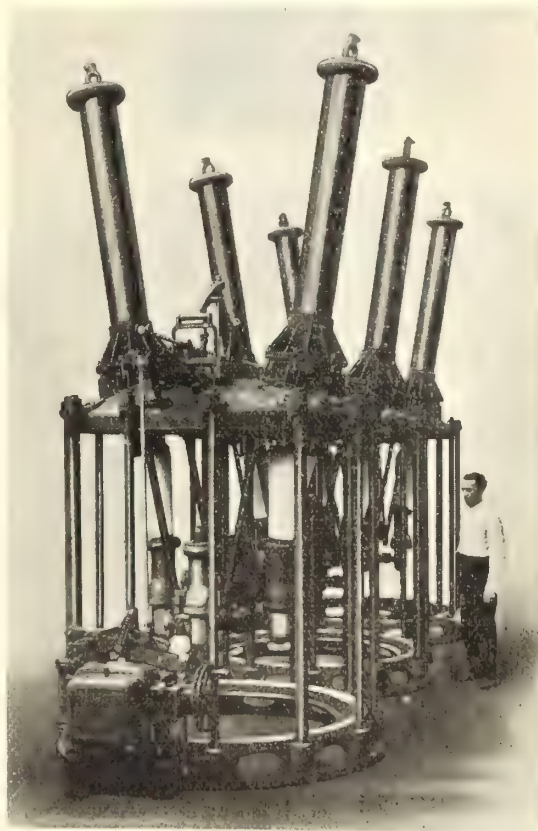


Fig. 4. 135,000 v., Type "GA-4" Breaker, without the tanks

are rupturing as the low tension heavy current breakers, yet the H.T. tank structures must be of ample strength to withstand any oil gas explosion possible. The liability of explosion of plain oil vapor is small, as this, when mixed with air is explosive within very narrow limits, viz., from $1\frac{1}{2}$ to 6 per cent. of oil vapor to air. The explosion pressure also does not exceed about 75 lbs. per square inch. Arcing under oil breaks up the oil more or less into various hydro-carbons, oxygen and hydrogen. Such mixtures are explosive when mixed with air through wide limits from 10 to 66 per cent. proportion to air, and may give violent explosions with pressures up to 120 lbs. per sq. in. If the generation of gas is rapid enough to give

1½ atmospheres compression before ignition, the explosion pressure is about 50 per cent. higher.

Many failures of high tension oil circuit breakers in the past have been traced to failure of the tank structures under such gas explosions.

Each pole of the breaker shown in Fig. 4 is equipped with four quick break contacts in series. In these large capacity

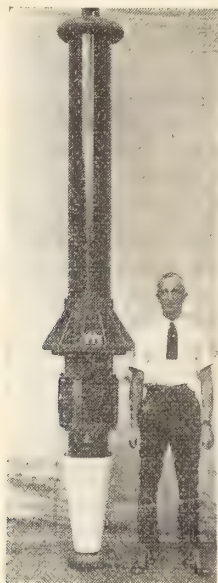


Fig. 5. 400,000 volt test Condenser Bushing

high voltage breakers the arcs tend to become long and "stringy." The current in this case (as compared with the L.T. breakers) is small, with slight magnetic blow out effect, and multi quick break contacts have proved very effective in rupturing such currents.

The bushings furnished with these H. T. breakers are of

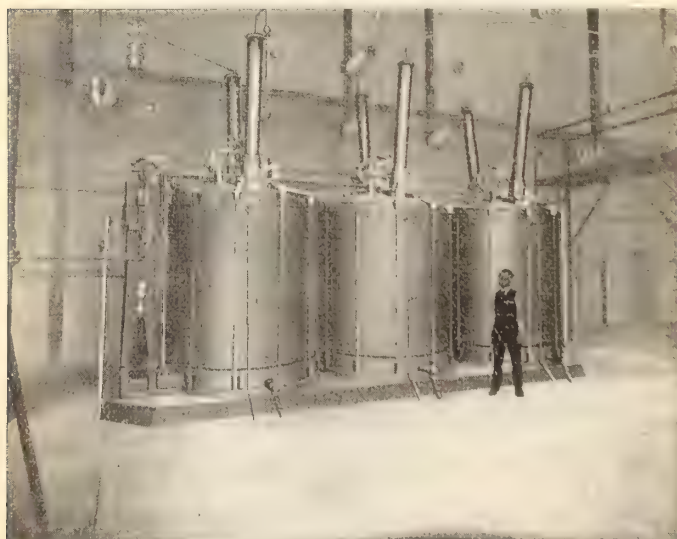


Fig. 6. 110,000 volt "Resistance" oil Circuit Breaker

the well known "condenser" type, designed to give a uniform distribution of voltage stress over and through the insulation. One of these bushings with bushing current transformer and porcelain arc shield is shown in Fig. 5. These bushings are all given a 400,000 volt one minute insulation test, and meet this test with entire absence of noise or any evidence of static. This test is equivalent to a flashover of over 42 in. between needle points.

A radically different type of breaker used for heavy ser-

vice, to a considerable extent in Canada, is the "Reactance" or "resistance" type, one of the H.T. resistance breakers being shown in Fig. 6. These are very massive breakers controlling the outgoing 110,000 volt Hydro-Electric Commission lines at Niagara, and contain over a ton of resistance grids per pole. Such breakers, whether H.T. or L.T., are of the "two step" design. In opening, the first step cuts into the circuit a suitable amount of reactance or resistance, reducing the short circuit current correspondingly, the second step finally opening the circuit. This resistance method was first used in some older plants to stop failures of existing breakers, a second small breaker being installed in series with resistance. This method proved so effective that in the later designs both steps were combined in a single breaker. Fig. 7 shows an oscillogram of

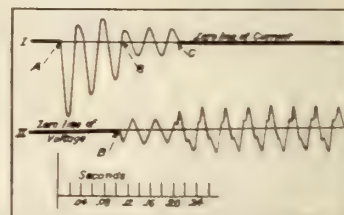


Fig. 7. Oscillogram of Reactance Breaker on short circuit

a reactance breaker clearing a heavy short. The short occurred at "A." At "B" one set of contacts opens, cutting in reactance, and at "C" the circuit is cleared, the time from "A" to "C" being less than ¼ second.

A very interesting low tension switching arrangement is now being installed in one New York and one Chicago station, viz., of spacing the three poles of each breaker fifteen or more feet apart in different structures. That is, all phase "A" poles would be in phase "A" structure, connecting to phase "A" bus, phase "B" poles in "B" structure, connected to phase "B" bus and phase "C" poles in "C" structure connected to phase "C" bus. This permits separation of the phases from the point where the connection leaves the generators, to the feeder pot heads. This arrangement gives some protection against trouble between phases, though serious breakdowns to ground are possible, unless considerable resistance is used between generator neutral and ground, or if two or more poles break down simultaneously. Also the bell crank mechanism required to operate the three poles adds considerable complication and inertia, tending to a poorer mechanical design than the ordinary unit three pole breaker.

The provincial hydro commission which is operating the Windsor-Amherstburg radial railway on behalf of the municipalities, is asking the Ontario government to guarantee \$900,000 of bonds for betterments to the line. The money is wanted to provide 20 one-man cars and renew the rails. The Government guaranteed the bonds for the purchase and some preliminary betterments to the extent of more than two million dollars.

Customers of the Barrie Municipal Electric System, will receive a refund of 25 per cent. on their bills of the first four months of the current year, exclusive of street lighting and waterworks pumping plant. The Hydro Commission having authorized this in preference to making a further reduction in rates at the present time.

The Canada Gazette announces the incorporation of Stanley J. Brown, Limited, with a capital stock of \$100,000, and head office at the city of Toronto. The new firm are located at 149 Victoria St. and will take over the electrical business formerly carried on by Stanley J. Brown.

The Manufacture and Testing of High Tension Porcelain Insulators

A Practical Description of the Processes Involved in Making and the Care Essential in Inspecting. Some Interesting Illustrations.

By A. D. ALLEN, A. D. Allen Inspection Co., Hamilton, at C. E. A. Convention.

It was brought to our attention that most of those engaged in the electrical profession, have but a vague idea of the processes involved in the manufacture of porcelain insulators. Upon the suggestion of one of your executives we prepared, illustrated with lantern slides, a brief paper covering the manufacture, inspection and testing of porcelain insulators. We are dealing with this subject not as ceramic engineers, but from our knowledge and experience gained from the inspection of insulators, during the last ten years, at the various insulator plants in the States and Canada. These lantern slides, which we are using to-day, are those which we secured at the Canadian Porcelain Company's plant in Hamilton and probably represent the latest developments in the ceramic art of making and testing insulators.

The materials generally used in the manufacture of hard porcelain are ball clay, china clay, feldspar and flint. It is the function of ball clay to make the mass plastic or workable; the china clay strong and dense when burned; the feldspar of a definite fluxing point to render the mass perfectly homogeneous, and flint to prevent too great shrinkage. All materials must burn white and dense so that the final product may possess the requisite mechanical and electrical strength.

Flint occurs in nature as pure silica, which is washed free of impurities and pulverized to prepare for the potter's use. Feldspar occurs as a rock which is carefully sorted at the quarry and pulverized. Ball clay and china clay are both aluminum silicates having their origin in feldspar deposits, which has weathered and from which the potash and soda have leached away. China clay usually occurs in nature mixed with mica and some free silica, which is removed by washing before shipment to the potter. It is weakly plastic. Ball clay is seldom treated in any way other than to weather in order to thoroughly break it up and permit maximum development of its prime characteristic of plasticity.

Flint and feldspar occur in nature as rock and require pulverizing before introduction into the mixture. For this purpose grinding cylinders as shown in photograph are provided and in order that no foreign matter may be introduced into the raw material these cylinders are lined with porcelain brick and half filled with flint pebbles. A charge of flint or spar is introduced through the manhole in the side of the cylinder, the proper amount of water added, cover put in place and the whole cylinder rotated till the flint or spar is reduced to the proper state of fineness, after which the cover is removed and the mixture of water and flint, or spar, run out into the blunger for final mixing with other ingredients.

The liquid flint and feldspar mixture from the grinding cylinders is received into a mixer or blunger to which is also added the requisite amount of ball clay and china clay. These latter materials being by nature very finely divided are merely dissolved or distributed in the flint-feldspar mixture. The resultant liquid of the four ingredients is at nearly the consistency of very thick cream and in potter's language is known as "slip."

"Slip" or liquid clay from the mixing machinery contains more or less foreign material which must be removed by care-

ful sieving in order that the "Body" or porcelain structure may be free of voids which would be caused by the burning or fluxing of foreign materials. For this purpose a shaking sieve is provided having a bronze screen containing in excess of 15,000 holes to the square inch. Two such screens or lawns through which all liquid must pass give absolute assurance of the cleanliness of clay solution.

The mining and shipment of the potter's raw materials entails much handling with the consequent introduction of more or less foreign matter, much of which is entirely harmless, but a certain amount of metallic iron is certain to become mixed with the clay and as such iron is hurtful it is desirable that it all be removed before forming the articles. Such cleaning of metallic iron is most easily accomplished while the clay is still in a liquid state, when it is easily passed by the poles of a powerful electric magnet which effectively removes all magnetic materials.

Up to this stage the clay is in the state of thick "slip," of cream-like consistency and a considerable portion of the



Fig. 1. Pressure Pump and Filter Presses.

water must be removed to produce a workable plastic mass capable of being worked into the desired shapes. Fig. 1. shows a pressure pump and filter presses, by means of which excess water is removed leaving a so-called leaf of plastic clay ready for working. Liquid clay enters at one extreme of the press and is forced at considerable pressure into the canvas lined cavities where separation of the water and clay substance takes place. When filled the iron plates are separated one by one and the leaf of clay removed after which the plates are again put in position and filtering resumed.

Plastic clay from the presses is seldom sufficiently uniform to permit manufacture of ware. It is necessary therefore, to work out all air pockets and bring the mass to a state of perfect homogeneity in order that the finished product may be free of voids and planes of weakness. This necessary condition is performed by passing all clay through a mill. It is essentially a tube in which revolving cutters on a vertical shaft force the clay powerfully against a horizontal revolving worm or screw, which causes the clay mass to be extruded from the orifice at the bottom homogeneous in state,

and of a form to permit ready working to the desired shape.

Art ware is formed by clay largely by hand and is essentially an expression of the individual workman's skill. Clay products of technical service must however, be made with great exactitude and it is necessary to substitute machine work for hand work. Nearly all electrical porcelain, especially high voltage insulators, are made in plaster of paris moulds. Such moulds are cast from exact plaster models. The exterior of the mould is usually framed by a cast iron ring machined accurately so that the finished mould will produce a product surprisingly exact in dimension. It is in the mould the plastic clay is finally shaped and it is the office of the plaster to absorb water from clay, and stiffen sufficiently to be handled. Moulds are made oversize to compensate for the inevitable shrinkage which occurs in the subsequent drying and burning of the ware.

The Potter's wheel, familiar to all ages, is still an essential tool in many clay working plants, but it is to-day a motor driven affair arranged mechanically to produce rapidly and accurately.

When large production is essential or where a screw thread is required the insulator press is utilized. As in the potter's wheel a plaster mould is used to form the exterior of the article, but in this process the interior of the article is formed by a plunger, which is made to rotate in either direction by powerful reversing clutches. At the completion of the downward stroke prompt reversion takes place leaving a mechanically accurate screw thread in the ware where required. This machine is equally serviceable in producing ware without screw threads, since the powerful pressing tends to produce denser and more homogeneous structure in clay wares.

The surface of clay ware made in plaster moulds is seldom perfectly smooth, and it is generally necessary to trim

drying is held up, and further, the interior is still moist when the outside is comparatively dry, resulting in minute hair cracks in the surface, as well as internal strains. A proper drying system requires the use of high temperature and high relative humidity, in order that the whole mass of clay may become thoroughly heated before any drying may take place. Once the clay mass is entirely heated the relative humidity may be reduced, while the temperature may be increased and drying progresses uniformly throughout the piece without producing strains or cracks.

Following complete drying of prepared ware all pieces are carefully inspected and blown clear of dust or other accumulations by a powerful stream of compressed air, in order that the glaze solutions in which they are dipped may adhere uniformly. The glaze solution is made up of clay, feldspar and cooling oxides, ground together to extreme fineness. The presence of excess feldspar in the glaze causes it to melt into a thin coating of glaze when subjected to the high heat of the kiln. No lead or other soluble oxides are used in coating electrical porcelain, since their presence would cause the insulators in the course of time to present

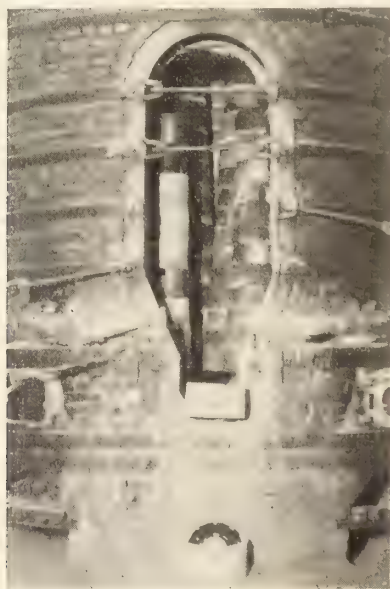


Fig. 2. Oven Shown in Section.

the surface of the clay product to an even surface. This may be done immediately after removal of ware from mould, when in a leathery state, or finishing may be deferred till the article is entirely dry.

Clay wares made in the plastic state contain considerable water, which it is necessary to remove before applying glaze, and in the case of heavy pieces required in modern insulators it is essential that this drying proceed properly else internal strains develop resulting in an electrically weak structure of short life. When dried in the open air heavy pieces are cooled by evaporation from the surface, with result that the



Fig. 3. A Rack of Insulators Ready for Test.

a slightly conducting surface. Basically all glazes are alike, the only variation necessary being in the coloring oxide, for white—tin, for brown—iron, for green—chrome, etc.

At kiln temperatures the glaze substance becomes nearly liquid and so spreads itself uniformly over the surface leaving a perfect glass like finish. Parts in contact with the pot or saggers in which the material is placed for burning, must be left free of glaze to prevent adhesion. Where a complete envelope of glaze is required on the ware it may be supported, if light in weight, on small fire clay points, or if heavy, article may be placed in sand which of course adheres to the surface where in contact. Such sand surfaces are sometimes applied for the purpose of presenting a roughened surface to facilitate cementing.

The pots in which high grade ware are burned are termed "saggers" and are usually made of fire clay, formed on a potter's wheel to the required shape and burned sufficiently hard to develop the requisite strength for the support of heavy clay wares.

The final operation in the production of porcelain is the process of burning, which is accomplished by gradually heating the ware until vitrification takes place, producing a dense, homogeneous product.

The oven in which burning takes place is shown in section Fig. 2. It is essentially a bee hive affair 18 ft in diameter, by 50 ft. overall height. The interior space of such an oven is packed full of saggers containing the ware to be burned, and a slow fire started in each of the ten fire holes. Fuel may be coal, gas, or oil, all of which are in wide use. At the expiration of 24 hours the entire contents have reached a dull red heat, and as all water has been removed the fires are in-

creased and the temperature raised to 2500° F. The firing period usually extends 60 hours and indication of satisfactory finish is registered by electric pyrometers, pyrometric cones and sample discs of ware which are periodically withdrawn and measured to ascertain shrinkage.

After firing has ceased, a period of 48 hours is allowed to elapse before opening the kiln in order that no cooling strains may be introduced in the burning ware.

After removal from the kilns the insulators are usually presented to the customer's representative for inspection in order to avoid further factory costs of handling defective ware. Much depends on the inspector, as no specifications have ever yet been devised which can be substituted for the good judgement of an experienced inspector in determining what porcelain should be put on the line and what should be rejected at the factory. Porcelain which is just under-fired or just over-fired is in general the most difficult to determine whether it should be accepted or rejected. Of course such defects as cracks, presence of an occasional foreign piece of matter in the body, warped, defective glazing, crooked assembly, etc.—are all readily detected and rejected.

The porcelain which has been accepted is then trucked to the pans for their first electrical test, where it is subjected to a voltage sufficiently high to break over the piece under such test. By proper proportioning of the piece the flashover voltage is usually 75 to 80% of its ultimate puncture strength, a safe value determined by many years of trial. The testing circuit is usually at 25 or 60 cycles, and so arranged that a snapping discharge around the porcelain is produced. Such a discharge oscillates at the natural period of the circuit and is found very effective in eliminating any defective porcelains.

The photograph, Fig. 3, shows a rack of insulators ready for test. The surface on which they are placed is metal and constitutes one electrode, the hanging chains dipping into the water with which the interior is practically filled from the other electrode, to which a voltage sufficient to flashover the articles is applied. The shells which have successfully passed over the tracks are then, if of the pin type, cemented, or if of the suspension, capped and pinned. After which operation they are inspected for cementing and assembly. Then those accepted are placed on the racks for their final flashover.

Manitoba Electrical Association Boosts Every Form of Clean Sport.

The Manitoba Electrical Association is fast becoming an influential and important factor in the community life of Winnipeg. In its wider activities it is the purpose of the association to stamp with its approval or disapproval all matters relating to the public welfare, to take a stand and exert itself in the community life of Winnipeg, to lend its influence and support to all movements—social and athletic.

On Friday, the 22nd of July, the Manitoba Electrical Association certainly showed the citizens of Winnipeg that the electrical men were a live bunch, by attending a booster night for Canada's National game, "Lacrosse." Over 300 members of the association, with their families, attended the "Stadium" to see the Tigers and Nationals play to a draw of 5-5, after playing extra time. The Lacrosse Council had a section of the grand stand reserved for the Manitoba Electrical Association, and the electrical men had large banners with the name of their association scattered around the grounds. The members were supplied with motor horns; also whistles by A. M. Dobbs of the Canada Dry Cells; and various other musical and non-musical

instruments, and were not slow in displaying their musical (and non-musical) talent.

Mr. McLimont Springs Surprise.

A. W. McLimont, vice-president and general manager of the Winnipeg Electric Railway Co., also a member of the Manitoba Electrical Association, played his part in "boosting" lacrosse. After Art McFadyen had finished his appeal to the members of the association at Thursday's luncheon to buy 100 admission tickets to the lacrosse game, Mr. McLimont very generously offered to take the whole 100, and eventually a total of over 300 tickets were sold.

A very handsome reading lamp was donated to the Lacrosse Council by the Manitoba Electrical Association, to be drawn for by the fans at the second intermission. The lucky winner was S. McMinn, a member of the sales force of Messrs. Schumacher-Gray Co., Ltd.

Northern Electric Company's Picnic

(By Special Correspondent)

The Vancouver branch of the Northern Electric Company, Limited, held their annual picnic at Bowen Island on Thursday, July 7th. The weather was a little cloudy, but it was an excellent day for the races and sports which were held.

A fine programme was arranged, which kept everyone on the move from the time the boat left the dock at Vancouver at 9.15 a.m. until the party returned tired, but happy, at 7.30 p.m.

The wives, families and friends of some of the employees, totalling about 125, attended, and from the comments heard



The Vancouver branch of the Northern Electric "family" is plainly a lusty child. Inset, left to right, are:—Charlie Dunbar, District Credit Manager; Jack Martin, District Stores Manager; and Bill Mainwaring, District Sales Manager.

since it is more than likely the picnic will be an annual affair.

Some very amusing incidents are related regarding the sports:

'Tis said: "That Harry Morris of the sales department would not have suffered the sprained wrist had he used his feet instead of his hands to play football."

It is also said: "That, as a baseball umpire, Mr. Sellars would make a good referee at a bull fight."

Messrs. Vaudry & Matte, 43, St. Joachim St., Quebec City, have been awarded the contract for electrical work on Sacred Heart School being erected at Quebec City for the R. C. School Board at an estimated cost of \$175,000.

The Consulting Engineer's Relations with the Power Companies

The Engineer is an Arbitrator who Maintains the Balance of Justice and Equity between the Central Station and the Customer. His Experience is of a Specialized Nature and his Decisions are Impartially Rendered.

By J. M. ROBERTSON, Consulting Engineer, Montreal, before C. E. A. Convention

The time is not far past when for an engineer in independent practice to admit that he had any particular relations with a power company was almost equivalent to admitting that his motives and actions were properly subject to grave suspicion since it was taken for granted that no one could associate with such gentlemanly highwaymen—operating under the guise of public utility companies—without becoming more or less contaminated. Those were the days when the most popular, even if not the most refined expression of the policy of the power companies was "The public be damned."

Fortunately the devil is never quite as black as he is painted—but even the most favorably disposed observer had to admit that the companies even if they were not black all over were certainly not white. Some of us even in those days had hopes that there was enough vitality about the white part to ensure its eventually displacing at least a large part of the black. I am glad to be able to add the small weight of my testimony to the fact that most of the criticisms which were formerly levelled at the power companies for very questionable dealings would now be quite out of place.

I flatter myself that I was among the early exponents of the theory that there was nothing inconsistent in a power company being on terms of confidence with its customers—and more than that, its real success could be largely gauged by the good feeling that existed between the customers and the company.

Dealt Direct with Customer

In those days it was the usual custom for the power company to deal directly with its customers—or in the case of an important contract, with the legal representative of the customer—and the feeling of the customer regarding his chances of getting an equitable deal from the company was more or less on a par with the feeling of the wayfarer when confronted by the highwayman with a pistol. In the eyes of the consumer the deal was most obviously one sided.

The company was presumed to know its business thoroughly—and all the weak and strong points in the situation—and the customer was presumed to know little or nothing of so obscure a business as electrical power—and it was, of course, taken for granted that the company would take full advantage of the situation and come out of the deal with all its demands agreed to—and the customer would, of course, take what was handed him and try to look thankful. At this time consulting engineering—more particularly in the electrical line—had not developed to the point where it had become the custom for intending consumers to call in assistance in conducting negotiations and completing contracts, and consequently, each consumer was compelled to do the best he could without the assistance of specialized information regarding the prevailing rates and conditions in the community in question for service such as he might require. As a rule the consumer had not even the knowledge of his own probable requirements—which would permit him to analyze his problem and present his demand to the company in such a way as to secure the most favorable rates available.

The increasing utilization of electric power and the develop-

ment of specialization both in the industrial and professional departments of recent years has made it imperative—if the best results are to be obtained—that such special problems should be handled by those who have made a study of the situation—both from the point of view of the power company and of the consumer. Such a specialist is in a position to advise the consumer as to the most satisfactory methods of utilizing electrical power and is able to suggest the most desirable scheme of operations in order to secure the most favorable rates. He can usually indicate pretty closely what the power cost will be under any given scheme, and having with the co-operation of his client worked the problem down to the basis which appears most desirable, in view of all the conditions, he is in a position to approach the power company with all the data necessary to convince them that his conclusions are sound, and that the rates for the service required should be substantially as anticipated by him.

In territories where the power companies are operating without standardized rates—or with rates standardized for the smaller users only the responsibility devolving upon the engineer becomes much greater as his handling of the situation



Mr. J. M. Robertson, Consulting Engineer

may make a very considerable increase or decrease in the costs of power for his client.

Power Companies Consistent

Power companies—notwithstanding the still persistent impression that they operate on the principle of "all the traffic will bear"—are more or less consistent and to a certain extent influenced by precedent, and if the engineer is sufficiently experienced he can quote chapter and verse in support of his contention. The old idea that the power company having at its disposal all the available knowledge of the subject started the negotiations with a lead, which the customer could never hope

to overtake, has been pretty well dissipated. Such negotiations under present conditions when conducted by competent parties are practically certain to result in contracts which are reasonable and fair to both parties.

I think that it is a fact that any power company would much prefer to carry on such negotiations with a competent independent engineer familiar with the conditions of demand and supply, and able to judge of the effect of suggested variations in the rates and conditions rather than with the principal himself.

The atmosphere of veiled hostility on the part of the consumer—which unfortunately persists to this day—more particularly on the part of the older generation who recall the good old days when they took what was handed to them and tried to be pleased that it was no worse—is entirely absent. In place of it is an atmosphere of straight business between two equals, each fully informed as to the peculiarities of the others position, and both able to weigh and judge of the weakness and strength of the points raised. There is no question of taking advantage of a man uninformed in the niceties of the business and “putting something over” in such way that the “come back” is certain and sure, as soon as the bills begin to come in, with the result that another victim advertises the fact that fair dealing and power companies are entirely incompatible.

Must Have Confidence of Client

It goes without saying that in doing work of this kind the engineer, if he is to be in the best position to further his client's cause must have the confidence of the client to such an extent that a bargain having been made with the power company the client will stand behind the agreement without variation.

Nothing is more subversive of satisfactory dealing than the feeling on the part of the power company that an understanding with the engineer is not necessarily an understanding with the customer—and that such an understanding having been reached the matter is still unsettled. Everybody appreciates the great difference between an offer for firm acceptance and an offer for negotiating purposes—and if the engineer is unable to definitely accept he is not likely to get the best bargain.

There are, of course, many districts where the making of a contract does not involve any discussion of rates at all, as all rates are standardized and each class of service takes its proper discount. Under these conditions the task of the engineer is much simplified. His work is largely confined to advising his client as to the method of use so as to place the service in the most favorable class and secure adequate service for the lowest possible cost.

Even in such cases the intervention of the engineer is of considerable advantage to the power company, as few things are less satisfactory than trying to explain the why and wherefore of certain rates and conditions and their bearing on each other to a person who knows nothing whatever of the business and cannot possibly understand the inter-relation of the various factors involved. It is proverbial that it takes two to make a bargain—and no bargain is a good bargain unless it is good for both parties. If this is true for merchandise transactions when the parties usually separate as soon as the deal is completed—how much more must it be true in the case of a power contract when the association of the parties only commences upon the completion of the agreement and continues for many years with a potential dispute in every monthly bill. Certainly a power contract which leaves a sore customer is a very questionable asset to the power company—even though the return is entirely satisfactory.

On the other hand—there are people in the world who cannot feel that they have secured a fair deal unless they have left the field with all the honors in right—or as they usually express it—“Have put it all over the power company.” Such a one, though hard to satisfy on any reasonable basis, is much more likely to accept the assurance of his engineer in whom he has confidence that the rate he is getting is right and fair, than

the statement of the company that the rate is exactly what he is entitled to.

Watch the Contract Working

The execution of a contract does not end the interest of the man who specializes in work of this kind. He is just as much interested in watching the working out of the arrangement as in making it. In many cases business conditions change very materially after a contract is signed, and the contract rates and conditions are found to be quite unsuited to the new business conditions, with the result that the power bills run much above what they should.

If such new conditions are likely to be permanent it is the business of the engineer to take the matter up with the company with a view to either cancelling the contract and substituting for it some more equitable arrangement—or modifying its terms so that the result more nearly represents the standard return for the service supplied. Of course, the company in such a case is not legally obliged to make any concession, but if the engineer has their confidence and is experienced in his profession he is usually able to convince them that it would be good business to meet the customer fairly and adjust such differences on their merits and not on technicalities.

Speaking as an individual having rather frequent and close relations with most of the prominent power companies in the eastern part of Canada I am pleased to be able to say that I have found the companies at all times ready to take a fair and reasonable view of such requests and in some instances I have been agreeably surprised by the granting of concessions which to be perfectly frank I had little hope of myself.

Harmonize Conflicting Interests

In acting as intermediary in negotiations of this kind the engineer should feel that he is not exactly a special pleader for his client. His position is much broader than that. He should feel that it is his business to harmonize the conflicting elements in the situation, and by reason of the fact that he is in the confidence of both parties work out a basis that will be mutually satisfactory. The power company should feel that he is a friend who will not improperly use his position or knowledge to the advantage of his client at their expense, though, of course, he is expected to protect the interests of his client to the extent of seeing that he gets fair and reasonable treatment.

A reputation for fair and straight dealing is one of the most valuable assets that an engineer can have—and one which in that business pays bigger dividends than any other I can name off hand. Clients do not engage engineers because their looks are attractive—but because they can secure results—and obviously an engineer on confidential terms with both parties can get done things that are quite impossible on a strictly legal and formal basis.

Fortunately all the factors which make for a more satisfactory understanding between the companies and the consumers are working in the same direction. The companies are becoming more reasonable and less arbitrary. The consumers are becoming more familiar with fair treatment and have less fear of the company. The engineers are becoming more experienced and perhaps more diplomatic, and their clients are placing more confidence in them. The result is that, while the business is growing rapidly, the good feeling is growing even more rapidly, and I am sure that with such a body of interested people all pulling in the same direction the future of the power business must be beyond question.

Obituary

Albert Taylor, manager North Atlantic District, the Electric Storage Battery Co., and well known in the electrical industry, died suddenly on July 6th in New York. Mr. Taylor was taken ill in his office, 23 West 43rd Street, New York, and died a few hours later in the hospital. He was buried from his home in New Rochelle on July 8th.

The Contractor-Dealer

Big Convention of Contractors and Dealers in Buffalo

A running commentary on the proceedings at which a number of prominent Canadians were in attendance

By G. E. B. Grinyer, Contractor-Dealer, Guelph.

[Mr. G. E. B. Grinyer, electrical contractor-dealer of Guelph, Ont., has very kindly consented to give Electrical News readers a running idea of the proceedings at the convention of the National Association of Electrical Contractors and Dealers. This is no cut and dried report, for it was not until Mr. Grinyer's return to his home town that the request was made. Indeed, it was not until Mr. Grinyer had set aside the cares of business for a brief two week's rest on Lake Couchiching that his anticipations of a real holiday were rudely broken by the arrival of the postman with our request for his co-operation. We had pointed out to Mr. Grinyer that the urgencies of the strike situation had made it impossible for the Electrical News to be in attendance at Buffalo and with his usual desire to be of service to the electrical industry, he sat down and wrote, offhand, the following report. We would not spoil it by changing or curtailing it. It is typical of the view point of the better type of contractor-dealer of the value of organization. We are very hopeful that Mr. Grinyer's seed will fall on good ground and spring up to yield one hundred fold.—Editor.]

The purpose for which I attended was to see what good the National Association would be to an electrical dealer in Ontario.

It was only a few weeks ago I journeyed up to Stratford one afternoon to talk matters over with some of the dealers in that city, and to find that they were thinking along the same lines as the dealers in Guelph. Only a short time elapsed when two of the Stratford boys paid a visit to Guelph to discuss matters which were affecting every dealer in Western Ontario. They called at Kitchener and Galt, finding the conditions the same as in other centres.

Some of the dealers were asked to go down to Niagara Falls, where the convention was being held, and after taking notes we decided that it was very important that if the electrical contractors and dealers were to get anywhere, it would be absolutely necessary for some organization to be formed **at once**.

At the Clifton House we decided to start the ball rolling by making a move towards the bringing together of the dealers of Ontario to discuss the advisability of forming a real organization. Special invitations were sent out to as many of the electrical dealers as it was possible to secure names and addresses of, inviting them to meet at the Royal Connaught, Hamilton. This meeting was very largely attended, but owing to the big fire in Guelph the night previous, in which my place of business was completely destroyed, I was prevented from being present at that conference. I learned that the opinion of the meeting was to link up with the Ontario Association and, through them, with the National.

Shortly after this meeting I received an invitation to attend the convention which was to be held in Buffalo from July 18-23, but, owing to the shock which I had just recently come through (just barely escaping with our lives), and the total loss of my home and business, it was hard to find the time to attend. Yet I felt that possibly an opportunity would be lost if I failed to take advantage of it. I can verify this since coming back, and can assure you it was time well spent and a great privilege to anyone who is interested in the welfare of the electrical industry. From what I could secure from this convention, there is only one way for the dealers to gain their objectives, i.e., **to be strongly organized to protect their own interests**. By affiliating with the National Association it would strengthen our hands in accomplishing many a difficult problem, some things that require immediate attention, and by being a link in the National Organization it would assist us in putting over the "Electrical Idea," and making it worth while to those who are engaged in this enterprise. To those who are holding back, and not giving the support to this organization which is benefitting every man in the electrical business, I would urge that they take a bigger viewpoint of the situation and be willing to make some sacrifice of time to the industry to which they belong. When men with the calibre of Goodwin, Strong, Martin, Peet, Sanborn, Kiball, McIntyre and a score of other prominent men have seen fit to give their time to the building up of the electrical industry, it is only fair that

Nova Scotia in Convention

The first annual convention of the Electrical Association, Province of Nova Scotia, is being held in Halifax, on Tuesday and Wednesday, August 16 & 17

everyone else should do something in trying to bring about better conditions. Especially is this so in Ontario. Otherwise, if the dealers are prepared to sit back and not take some stand for their business as a whole, do not blame the association for the conditions which are existing to-day. We, as dealers, have allowed conditions to creep into the business and adopt certain practices that are very detrimental to any merchant's interest.

It is not the idea of any electrical merchants to keep other people from entering into the merchandising of electrical goods, but we ask that we have some protection against unfair competition. This will be accomplished, after all, by the effort which each individual puts into it. With that thought in view, I went to Buffalo, seeking information and getting out of it a wonderful lot of good. I was unable to be present at the opening session on Wednesday morning, which started at 10 o'clock, but arrived some two hours later. The opening address was given by E. D. McCarthy of Buffalo, chairman of the Local Convention Committee, and the address of welcome by Hon. George S. Buck, mayor of Buffalo, being responded to by James R. Strong of New York city, chairman of the National Association. Chas. L. Eidlitz of New York, first president of the National Association, gave as his subject "Twenty

Years in Twenty Minutes." By the comments his address certainly was greatly appreciated. Before the adjournment of the morning session Samuel B. Botsford of Buffalo gave a talk on "The Business Outlook."

After the adjournment at 12.30 a convention photograph was taken at the Soldiers' and Sailors' Monument, opposite the Lafayette Hotel. The afternoon session assembled at 2.00 p.m., when the presentation of Emblems was made to Mr. Peet, M. Stearns of New Orleans, seventh president of the association, officiating.

Installation Costs.

Following this Mr. Kenneth A. McIntyre, Toronto, gave a paper on "Installation Costs," which possibly appeals rather more to the larger contractors. At this meeting quite a number of the members assured Mr. McIntyre that they would give his plan a fair trial for the benefit of the association, and no doubt the Electrical News will see that Mr. McIntyre's paper is published. (Yes, see this issue.—Ed.) Mr. McIntyre is to be congratulated on the manner in which this was presented and for passing this information on for the use of the electrical trade. It is just such men as these, giving much of their time and thought, that are making this electrical organization worth while, and to any who were unable to attend this convention, my advice would be to see that when such opportunities offer themselves again, that a representative be sent from your local to bring back some real food for thought and then put some of the practices into action.

The Ladies, Too.

The ladies who attended the convention were well provided for on Wednesday afternoon. An automobile trip was arranged and on the same evening everyone joined in an informal reception and dance.

Thursday morning at 10 o'clock Lawrence W. Davis gave a report on his work. He is doing a big work in the National Association.

Growth of the Association.

In a paper compiled by W. H. Morton, secretary, it was interesting to note the growth of the association since 1901, when it was organized by 49 representatives of concerns in business, but as a number of these came as delegates from local meetings, it was estimated that approximately 146 contractors were represented. It was the unanimous sense of the meeting that a National Association was desirable. A constitution and by-laws was formally organized with a membership of 31 contracting concerns.

On July 16, 1902, the second convention was held at Philadelphia, in which Mr. Eidlitz was re-elected president. At this meeting in his opening address he made the following statement: Thirteen years ago two electrical contractors met in New York and discussed the feasibility of organizing an electrical contractors' association. He stated that these two men are attending the present convention and he asked them whether either of them had an idea that in a dozen years there would be an electrical organization in practically every city in the United States and that they were all going to be combined for mutual benefit. He further remarked that he could see from the face of one of them that he had no such an idea. He also stated that the 49 men who met in Buffalo and decided to organize. A great number of these men are in this convention hall and that he could answer for them also that they had no idea that in one short year this organization would be well and favorably known throughout the United States from Maine to Cuba and across to California, and even as far West as the Philippine Islands.

At the second convention there were 196 members; at the third convention, held in Detroit, the report showed a membership of 231; in 1904, at the fourth convention, held in St.

Louis, showed a membership of 402, an increase of 74 per cent. In 1905, at the fifth convention in Boston, there was a membership of 604; during 1905 to 1910 the membership remained very much the same. In 1911, on its eleventh annual convention, which was held at Niagara Falls, the membership ran up to 901, being 221 higher than the previous year. That year the first bulletin of data on cost of doing business was issued. The same year the travelling representative, Geo. N. Duffield, presented a report of his first year's work, showing that he had travelled 45,000 miles, had seen 2,100 concerns and secured 402 members. When the twelfth convention was held in Denver on July 17, 1921, the report of membership was 1,173. In 1913 the thirteenth convention was held in Chattanooga, with a membership of 1,268. When the fourteenth convention was held in Detroit in July, 1915, the membership was 1,133. At this time the introduction of the standard bookkeeping system was made with a sale of 180 sets and the adoption of a universal estimate sheet, of which 52,000 had been distributed. In 1915-1917 the membership stood very much the same. In the year 1917, as result of Mr. Goodwin's address, and his outline of a plan for scientific merchandising in the electrical industry, together with the preliminary work done by a special committee of J. R. Strong of New York and E. McCleary of Detroit, the plan of organization of the association was entirely changed.

Country Into Districts.

The new organization plan divided the country into districts along geographical lines; provided an executive committee in place of a Board of Directors, and enlarged their powers; recognized the increasing importance of retailing as a branch of the industry and provided for an associate membership for those concerns whose principal business was not contracting or retailing.

The name was changed to the National Association of Electrical Contractors and Dealers, and the officers were continued in their respective positions pending a meeting of the newly formed executive committee.

At the eighteenth annual meeting held in Cleveland the report of the Membership Committee showed 1,226. In March of that year the official magazine of the association was changed to the Electrical Contractor and Dealer. At Milwaukee the nineteenth annual convention was held and the official reports showed a membership of 1,646, an increase of 34 per cent. in the year.

The twentieth annual convention was held in Baltimore on October 6 and 8, and was the largest meeting in point of registration ever held by the association, being especially notable on account of the large attendance at every session. The reports showed a membership of 2,150 and that the financial condition was good. The employment of a special representative for field work, the retiring of the five-year bonds issued by the association in 1918; the research work in regard to the cost of doing business; the adoption of a simplified business record for concerns not employing a bookkeeper and issuing of a monthly bulletin for members only, constituted some of the important factors taken up at that time.

This takes us up to the present time, when we learn with interest of the work of Lawrence W. Davis, whom I understand has charge of work as a special representative of the National Association. On Thursday morning we also listened with interest to John J. Gibson of Pittsburg, his subject being "Are the Manufacturers' Efforts Appreciated?" and to W. E. Robertson, Buffalo, on "Electrical Contractor-Dealer vs. Non-electrical Contractor-Dealer." The report of the Council on Industrial Relations, L. K. Comstock representing N. A. E. C. & D., and J. P. Noonan, president I. B. E. W.

Conducting an Electrical Contracting Business.

The afternoon session of Thursday was taken up with an address by M. H. Johnson of Utica on "The Conducting of an

Electrical Business," this being one of the best educational talks during the whole convention. He outlined the following points: The purpose of business being to earn money, he classified the necessary function, which he put in three divisions: 1—Selling—by which is meant every effort to procure orders or sales of the wares handled. 2—Executing these orders—including procuring the goods and placing them as required by the buyer. 3—Financing and accounting—covering the necessary fiscal activities and records of business. He dealt with the grouping of all activities under these heads, which he stated required careful analysis with which to check unnecessary activities that can be done away with. Many items of cost can be charged directly to individual jobs, like direct labor, materials and their transportation. These charges do not belong to expense accounts, but provision must be made for them when estimating for bids or charging for labor and material furnished. They must be used in determining the costs of completed jobs. Such items have mostly to do with the executing cost.

He further explained that the three divisions of activity are especially useful in handling expense items. Much advantage results from knowing the proportion of expense incurred for selling, executing and accounting separately. This advantage being great when further sub-division of expenses can be made showing how much attaches to the various kinds of business done. To make this possible, the business must be divided into groups or departments. It is apparent this can not be done according to the kind of material handled. For instance, selling a lamp socket over the counter is a retail sale; selling a box of them to a mill is a wholesale business, and when sockets are furnished on a wiring installation, it is construction work. The business is capable, however, of four general groups and numerous sub-divisions, according to general character.

(a) Construction—All business in which material is installed and labor therefore furnished.

(b) Lamps—All incandescent lamp sales.

(c) Supplies—Miscellaneous material sold without labor.

(d) Automobiles—Vehicles, batteries, including their repairs and accessories.

Further sub-divisions are advisable for a large general business such as:

Construction.

1. Interior wiring; conduit work, including all fittings installed therewith.

2. Fixtures, including all electric lighting appliances and installation of same.

3. Lighting plants, including all prime movers, generators and their installation.

4. Outside construction, pole line, underground and railway work.

5. Motors, controllers and commercial motor appliances and repair work.

Lamps.

6. Standard incandescent lamps.

7. Auto and miniature lamps.

Supplies.

8. Motor driven domestic appliances, including washers, cleaners, icers, etc.

9. Retail store sales, including heaters, cookers, wireless apparatus.

10. Wholesale business with industries and bulb purchases.

11. Seasonable articles, covering toys, Christmas tree lights.

Automobiles.

12. Automobiles, covering industrial, commercial and passenger motor vehicles.

13. Storage batteries and repairs on motor cars' electric equipment.

14. Supplies for automobiles.

Each group is capable of sub-divisions when required. Mr. Johnson dealt with how to determine the cost of work, and showed that accuracy is essential to success. Only in this way is intelligent bidding possible, and without it no knowledge can be had of results, as work is progressing.

Common Error in "Mark-up."

When making up estimates or finding selling price, profits and expense percentages are added and this sum taken from 100 per cent., the remainder is divided into the flat cost. It will be noted that the flat cost must be marked up about 54 per cent. to provide for 25 per cent. expense and 10 per cent. net profit. It is a common and disastrous error to use percentage of sales' price to make up flat costs, in spite of the many warnings that have been given against it. The consideration of all expenses as one item is sufficient only for concerns doing a small and simple business or with executives of unusual capacity for details. Better control is had by dividing them so expense of selling, labor, material and credit accounts, bear their proper share over and above that attaching to all the business done. Some expenses fall wholly in one of these items, but others must be split up for proper location, such as collection expense, selling, building expense, labor expense, material expense, automobile expense, financial expense, general expense. He stated that this system of keeping expense accounts is capable of great refinement, and that this system will give accurate results when all the business handled is of similar character and the seller can set his own price on all of it.

Another very fine thing brought out was that our business is very modern and consists in supplying scientific apparatus to the public. He urged upon us to avoid guessing when accurate estimate sheets and correct data can be used, and to also have an intelligent plan and an accurate record and compare them systematically all the time. In simplest form this principle is: "Know the detail of what you want to do and know the detail of what you are doing."

A good many more fine addresses were given, which time will not permit me to give you, such as "Financing the Contractor-Dealer," by Alfred E. Martin of South Bend, Ind.; "Capitalizing Your Opportunities," by William L. Goodwin of New York; "What a Trade Organization Can Do and What Some Are Doing," by Charles L. Esley of Chicago; "Economics of Retail Distribution," by C. H. Rohrbach of New York, secretary American Society Sales Executive; "Adequate Wiring for Proper Residence Lighting," by M. Luckiesh, Nela Research Bureau, Cleveland; "The Home Electric Idea," by O. H. Caldwell, New York, and last of all, something that was worth the trip alone, "Color Effects in Lighting," by Miss Beatrice Irwin of New York.

I could fill up as much paper again with good, sound facts carried away from this convention, but, as I stated before, I am not in a position to do this at the present time, as I am away up in the woods trying to drink in what Nature has provided for us, and to fit myself for some strenuous duties which I have to meet in the near future. I can assure you that if the surroundings have anything to do in this, it will have the desired effect. Geneva Park is one of the ideal spots—a real paradise. When writing these lines to-day I put part of these pages in my grip to keep the wind from blowing them away; when I turned around I found a squirrel in my grip running over them. They are so tame in the woods here that they will run around your feet and sit up in front of you waiting to be fed, and with the beautiful songsters in the trees and the lake breezes, Nature has been at its best since I arrived here.

Installation Costs in Contracting

By Kenneth A. McIntyre, Vice-president Beattie-McIntyre, Ltd., Toronto.

Is it safe to say that the importance of this subject, "Installation Costs," is generally recognized. Certainly attention has been drawn to it because of present business conditions. The day of the "cost plus" job departed some time since. Competition in all parts of the continent is more than keen. All contractors are faced with the same situation, but few were prepared to meet it. Industry at large is passing through a period of test and selection after the softening process of the last few years of inflated business.

The writer is no expert in the matter of installation costs—just an average contractor—and this subject is approached from that viewpoint.

The average contractor embarks on his business career with some technical or some practical training, but little or no business experience. If he is made of the right material he sticks through the long years, with little return for his effort, passes through the several distinct stages of his development and at last reaches the point where he should be able to cash in on his invested time.

At first his system probably consists of one paper covered book. This he develops by experience and enquiry until he has the equivalent of the comparatively simple "Business Record System" published by the National Association. The average contractor by this time has been prevailed upon to join the association.

After a time he requires a bookkeeper and is able to install the "Standard Accounting System" also published by the National Association. Thereby he now has available complete information regarding his business except in the matter of installation costs, on which he has only partial information. Not until completion of each job does he know how his actual costs compare with estimated costs and then only in bulk. During progress of work he relies largely on intuition.

In the matter of estimating, in the absence of a "Standard Estimating System," he has developed his own system based on the several valuable papers which have been given in the past, notably at the Cleveland 1918 convention by the Chicago Estimators' Association, and at the Milwaukee 1919 convention by Messrs. Uhl and Morley. He may not be aware of the existence of the Minnesota Association Estimating Manual which follows the plan of Arthur L. Abbott, chairman of the National Cost Data Committee. The fact remains that there is no "Standard Estimating System" and that the National Association does not yet publish a set of modern standard estimating forms. Both items, however, are on the program to be accomplished very shortly.

Much the same may be said regarding a standard "Unit Labor Cost Record." A paper on this subject was prepared by F. W. Lord and presented at the Cleveland 1918 convention. Various articles have appeared in the trade press since that time, but the National Association has not yet adopted and published a standard system, although this is already in tentative form and is referred to later in this paper.

Study His Costs.

At this stage the contractor is disposed to study his costs. He knows that the cost of each job consists of:

Labor,
Material and direct job expense,
Overhead.

Considering these in reverse order, the **overhead organization** should, of course, be so organized and proportioned as to render a complete service at the lowest possible gross cost. A

mistake may be made in endeavoring to attain merely a low overhead. A higher overhead, within reasonable limits, may be justified by a lower gross cost resulting from better planning and closer supervision. Nevertheless it will usually follow that the contractor who carefully watches his overhead will just as carefully watch his job costs.

As to **material costs** there is little excuse for mistakes. Material quantities can be accurately taken off, correctly priced, purchased accordingly and are readily checked.

Labor cost is the great variable. For the contractor to study his labor costs it is desirable that he be able to follow a standard method. Any system for checking and ascertaining labor costs must be directly coupled with the method used in preparing the original labor estimate.

The following are set forth as to purpose of and requirements for a "Unit Labor Cost Record":

Purpose.

The primary purpose of this system is to make possible the collection of labor cost data applying to electrical construction work, which can be used in estimated new work. A secondary purpose is to produce at stated intervals during the progress of a job, a comparison between actual costs and estimated costs.

Fundamental Requirements.

The following requirements are considered essential to the practical success of the system:

1. The data produced must be capable of application to work in all sizes and types of building.
2. The data produced by various investigators, on jobs of various characteristics, must be on some comparable basis.
3. The system must be as simple as can be devised to secure the desired results.

Do present methods meet these requirements? Interviewing the five largest contractors in Toronto (each having an annual volume in excess of \$100,000) disclosed three methods of checking costs. In each case, unit labor prices are used for estimating and are applied to conduit, outlet boxes, etc., in the usual way. The units are varied in value with the type of construction and anticipated job conditions according to the estimator's judgment.

The three methods may be described as follows:

Method No. 1.

Material installed and total labor expended are recorded under separate operations. Total labor for the period is checked against the labor estimated for the material installed.

Method No. 2.

Material installed and labor divided into separate operations are recorded for the period. Labor thus reported is expressed in dollars. During progress the cost is checked as in the above Method No. 1.

Method No. 3.

The work is divided into sections and the estimated labor is apportioned to each section. For each period the work completed is recorded; branch circuit work by number of outlets; feeders, etc., by number of units completed. Labor is recorded against each section and checked with estimated cost for that section.

None of the above methods satisfy requirements 1 and 2, because the data is shown in dollars instead of hours and because the data from each job is affected by the peculiar con-

ditions on that job and no factor has been applied to reduce the data to a comparable basis.

The "Standard Unit Labor Cost Record" is still in committee, but in its tentative form very closely resembles Method No. 3. The chief variations from present practice occur in the estimated system itself.

At the expense of repetition, let us consider the method of estimating advanced by Mr. Abbot in the December and January issues of the "Electrical Contractor-Dealer." The salient points seem to be:

1. Data is expressed in terms of time—minutes.
2. A base or standard time is given for each operation under the various classes of building construction. In determining these standard times, a certain average efficiency of workmen has been taken. The standard times are subject to correction in the light of further experience.
3. In estimating branch circuit roughing-in labor, certain operations are taken off in detail in addition to the material, such as:
 - Item 1. No. of feet of each size of pipe in floors.
 - Item 2. No. of feet of each size of pipe in walls.
 - Item 3. No. of outlets in floors.
 - Item 4. No. of outlets in walls.
 - Item 5. No. of times each size of pipe enters outlets in floors.
 - Item 6. No. of times each size of pipe enters outlets in walls.
 - Item 7. No. of times each size of pipe turns up or down in floor to go to a wall outlet or cabinet.
4. The standard times are increased by applying a "job factor" for uncontrollable conditions on the job which are principally:
 - (a) The floor area in which work will be continuous.
 - (b) Complexity of electrical work and the building construction.
 - (c) Efficiency of the general contractor.

A formula is set forth for determining the job factor, which is applied only to branch circuit roughing-in.

5. The average cost per hour is arrived at by estimating the crew to be used. The total cost per hour divided by the number of men in the crew gives the average rate per hour.

6. The time is totalled and then reduced to dollars and cents, using the average rate per hour.

To Quote Mr. Abbott:

"The point which it is desired to emphasize is not the merit claimed for this particular system, but rather the advantage of using a system whereby the estimator arrives at his results by a fixed and definite method of applying data. He can go back and retrace his steps at any time, can explain his process of reasoning to another party, and there is a possibility of growth and improvement in the system, because of the definite process followed. Any failure to arrive at correct results can be traced back, the source of error can be located, and the necessary corrections and adjustments can be made in the data or in the method."

The proposed "Unit Labor Cost Record" to parallel the above estimating system and to meet the requirements stated earlier in this paper has certain general rules:

1. All records of time shall be in the form of minutes per operation.
2. Records must account for all labor on the job.
3. Records are to be summarized semi-monthly.
4. A daily report must be secured from the job giving the labor distribution and work done. Reports of work done are in general to state the completion of certain definite work, rather than quantities of material installed.

5. To carry out the requirement of simplicity, investigations are for the present to be confined to the principal operations.

6. In order to establish a basis for comparison, the data secured is to be stated in the form of percentages of the base or standard times.

Three forms are required: Daily report, record sheet, and re-cap sheet. Data from the daily report is entered on the record sheet and then the totals entered on the re-cap sheet. The hours and costs are checked semi-monthly with those in the regular cost records.

For permanent record a final job report is made up giving the following data:

"Building—Area per floor, number of floors, type of floor construction, type of wall construction, use of building, computation of job factor for branch circuit pipe work.

"Labor Data—List the material used, showing quantities. Opposite each item of material give the standard time and the actual time in percentage of the standard.

"State how closely, in your opinion, the factors used in computing the job factor express the actual effects of the characteristics of the job and the building in increasing labor costs. State your opinion of the efficiency of the men working on the job, whether average, below average, or above average. State what unusual conditions existed, if any, which affected the labor cost."

By way of illustration appended hereto are: (if they can be printed in time):

- (a) Re-cap sheet for end of third week of small job.
- (b) Final job report for large job.

This method, it must be admitted, seems complicated until it is given a fair trial. The writer has been training four estimators in the use of this method, incidentally acquiring experience himself. The time has been well spent. Estimates are easier to check because of the definite method for judging job conditions. Furthermore, that judgment is later subject to checking.

Any system or method is merely a means to an end—in this case information as to our installation costs. Having that information, can we not expect to handle our work better, to train our men and to reduce our costs? Can we not with reduced costs compete on their own ground with the construction crew of an industrial plant or with our competitor who is ignorant of his costs. Business, more often than not, goes to the man who knows and who gets out and proves it.

We have expected more or less vainly for years that differential in price which we really earn and which would bring more of industrial business to us. Let us study our costs. Get our industrial prospect to study his and to compare the two. The business will come and so will the differentials.

Granted that we desire the information, it is surely essential that we have available for general use:

- (a) Standard estimating system.
- (b) Standard unit labor cost record system.

How to Go About It.

1. Co-ordinate, through the National Cost Data Committee, the work of the various independent investigators and of the several estimators' associations. Appoint on the National Cost Data Committee one active member from each organized State or Provincial Association.

2. Subject the proposed method to test and thus try it and improve it.

3. If anyone has a better method, get him to bring it forward. We want the best.

Once we have standard methods in use, data can be collected and distributed by the National Association. The results

RECAP

CONTRACT John Doe & Co

WORK ORDER 63251

FROM June 20th 1921 TO June 25th 1921 No 3

Class of Work	Work Completed			Time								Cost							
	Previous	This Period	Total to Date	Hours			Minutes Per Unit					Estimated		Actual				Gain	Loss
				Previous	This Period	Total To Date	This Period	Average To Date	Standard	Percentage of Standard		Per Unit	Total on Work Completed	Previous	This Period	Total To Date			
										This Period	Average To Date								
Branch Cir Pipe Floor Work	136	Change Brackets	136	210	1	211	—	92.8	79.8	—	116.1	0.865	117 90	130 79		63 131 42		13 52	
Branch Cir Pipe Wall Work	22	1	23	40½	1½	42	90	109.8	121.5	74	90.4	1.31	30 13	27 03		93 27 96	217		
Feeder Pipe ¾"	200	33	233	10	11	21	20	5.4	3.3	607	164	.0356	8 31	6 25	6 88	13 13		4 82	
" " 1"	—	19-1	19-1		3	3	9.5		4.8	198	198	.0518	99		1 93	1 93		94	
" " 1¼"		40-1½	40-1½		8	8	120	12.0	6.6	182	182	.0713	2 85		5	5		215	
" " 1½" 2 lines	720	209	929	60	36½	96½	105	—	8.55	134	78.8	.0855	79 46	39 10	23 90	63 00	16 46		
	5-L's	4-L's	9-L's					6.25	7.92										
" " 2"	55'	4'	59'	15½	1½	17		17.25	18.5		93.5	.20	11 80	9 53	45	9 98	1 82		
" " 3"	45'	1'6"	46'6"	17	1½	18½		23.9	20.9		114	.2257	10 38	9 99	45	10 44		06	
" " 2L's																			
Motor Cir Pipe ¾"	75	Change 75'		7	1½	8½		6.82	3.3		207	.0356	2 67	5 35	94	6 29		3 62	
Six Cir Cabinets		5-6 Cir Cabs 25-¾" 25-¾" 10-¾" w 10-¾" w			30	30	360					2.52	12 60		19 15	19 15		6 55	
6x6x3" Pull Boxes 2 lines	1-16x6 3-6x6	1-16x6 7-6x6 10-6x6		8	11	19	94.3	360.0 78.0	120	145	140.5	1.30	14 30	5 20	9 15	14 35		05	
400 amp 250 volt Sv Sw		3	3		16½	16½	330		170		195	1.84	5 52		13 33	13 33		7 81	
Channeling Walls	17'		17'	1		1								95		95			
Installing Hangers	26	18	44	11	7	18							29 69	7 10	4 46	11 56	6 61		
Handling Material				9	12½	21½								270	5 10	7 71			
Supervision				2½	½	3								2 38	48	2 86			
														246 37	92 69	339 06	27 06	39 52	
W- Indicates pipe entrance-wall box or cabinet																			

W- Indicates pipe entrance-wall box or cabinet

of time studies can be applied by all those using the standard methods. This is not a new proposal. F. W. Lord suggested the same thing three years ago, but war conditions prevented much activity.

The proposed method can be tested by any contractor without interfering with his present system. I venture to say that there are twelve men in this room who are sufficiently interested to try this method on two or three jobs and let the committee have the benefit of their constructive criticism. It is a worthy task for even the very largest of our member concerns. Who will volunteer?

This paper has been purposely made brief to permit of discussion. Kindly utilize the remaining time to good advantage.

Example of "Final Job Report."

To accompany paper on "Installation Costs" 1921 Convention N. A. E. C. & D.
John Smith Company, Limited, owners.
Work completed in 11 1/2 months.

Work Included.

2/4000 volt, 3 phase services from pole to power house, run underground in fibre duct;

High tension switchboard in power house;

High tension feeders in fibre duct to 3 transformer vaults and to bank of transformers in power house.

Installation of transformers—

Building "A"—3-200 kv.a. for general power.

3-100 kv.a. for light.

1- 50 kv.a. for general emergency light.

3- 50 kv.a. for fire pump (separate vault).

Building "B"—3- 50 kv.a. for light.

Low tension distribution—3 phase 220 volt power; 1 phase 220-110 volt light.

Building "A"—221 ft. x 342 ft. (less light well 77 ft. x 159 ft.), 10 floors, including basement.

Building "B"—82 ft. x 586 ft., 4 floors, including basement.

Power house—96 ft. x 66 ft., 1 floor and partial basement.

All floors flat slab reinforced concrete—Class A.

Current News and Notes

Belmont, Ont.

The village of Belmont, Ont., will install an electric lighting system in the near future.

Calgary, Alta.

The Cunningham Electrical Co., Ltd., Leeson & Lineham Block, have secured the contract for electrical work on Upper Hillhurst school, which is being repaired.

Chatham, Ont.

Mr. A. M. Knowles, 544 Talbot St., London, has been awarded the contract for electrical work on an addition being built to the hospital on Emma Street, Chatham, Ont. at an estimated cost of \$75,000.

Edmonton, Alta.

The Carey Electric Co., 10352 Jasper Ave., have been awarded the contract for electrical wiring on two wings to be built to the St. John's Juniorate College at an estimated cost of \$80,000.

B. L. Perry, Limited, 10033, 102nd St., has secured the contract for the electrical work on a store recently erected on Jasper Ave. for Messrs. Thompson & Dynes.

Hamilton, Ont.

The substation of the Dominion Power & Transmission Company, situated on Victoria Ave. N., Hamilton, was struck with lightning recently which did damage to the extent of approximately \$100,000.

The Electric Supply Co., Ltd., 65 James St., S., has been awarded the contract for electrical work on an addition and alterations that are being made to the Technical School, Wentworth St. N., Hamilton, at an estimated cost of \$700,000.

Messrs. Avis & Jermy, 157 Balsam St., have secured the contract for electrical work on a synagogue being erected at Park & Hunter Sts., for the Beth Jacob Congregation.

Kitchener, Ont.

Messrs. Wattel & Bierwagen, Kitchener, Ont. have been awarded the contract for electrical work on a business block being erected on King St. E., Kitchener, for Mr. Fred Berg.

Leduc, Alta.

Tenders were received by the town of Leduc, Alta., up to July 29th for power house equipment and other materials required in the installation of an electric lighting system.

Minto, Man.

The Boyd Electric Co., Brandon, Man., have secured the contract for electrical work on a Memorial Hall to be erected at the town of Minto, Man.

Montreal, Que.

Tenders will be received by the Administrative Commission of the city of Montreal from July 25 to August 20 for the erection of an electric pumping station at Pointe St. Charles.

Mr. Fred J. Smith, 126 St. Peter St., has secured the contract for electrical work on a new bank building to be erected at Drummond & St. Catherine Sts. for the Merchants Bank of Canada at an estimated cost of \$150,000.

Work has been started on a new radio telegraph station at Sault Aux Recollets for the Department of Naval Service. It is claimed that when completed this will be one of the largest and best equipped stations in the Dominion.

Messrs. Philip Lahee & Co., 3 St. Nicholas St., have secured the contract for electrical work on a building at Mount Royal and Papineau Aves. that is undergoing alterations for the Royal Bank of Canada. Also the contract for

electrical work on a \$250,000. school building being erected for the R. C. High School Board.

Mr. G. A. Roy, 2637 St. Urbain St., Montreal, has secured the contract for electrical work on two apartment houses recently erected on Prud'homme St. at an approximate cost of \$70,000.

Mr. O. Tardif, 2550 Ontario St. E. Montreal, has been awarded the contract for electrical work on an extension being built to the Club building at 460 Pie IX for the Chevalier de Colomb.

Niagara Falls, Ont.

Approximately 3,000 men engaged on the night shift at the Chippawa canal, have been discharged.

Ottawa, Ont.

Mr. Stan Lewis, 63 Metcalf St., has secured the contract for electrical work on a building on Sparks St. that is undergoing alterations at an estimated cost of \$60,000. The Bank of Toronto will occupy the building when the work is completed.

The Standard Underground Cable Company of Canada, Ltd., 211 McGill St., Montreal, has been awarded the contract for low tension cables by the Ottawa Hydro-electric Commission.

The Canada Gazette announces an increase of the capital stock of the Canadian General Electric Company, Ltd. from \$12,000,000 to \$20,000,000.

Mr. H. L. Allen, 272 Bank St., has secured the contract for electrical work on a bread factory being built at 458 St. Catherine St. for the Slinn Bread Co. at an estimated cost of \$25,000.

Provost, Alta.

The Hillas Electric Co., 10823 Jasper Ave., Edmonton, Alta., have been awarded the contract for electrical work on a municipal hospital to be erected at Provost, Alta., at an estimated cost of \$35,000.

Regina, Sask.

The United Electric Company, Ltd., has been awarded the contract for electrical work on Kitchener School, which is being erected at an estimated cost of \$150,000.

Saanich, B. C.

Mr. T. L. Boyden, 1126 Broad St., Victoria, has been awarded the contract for electrical work on an addition that is being built to Tillicum school, Saanich, B. C.

Sandwich, Ont.

The McNaughton-McKay Electric Co., Windsor, Ont., have secured the contract for electrical work on a fire hall being erected at Sandwich, Ont.

Saulte Ste. Marie, Ont.

The Rapid Electric Co., 725 Queen St. E., Saulte Ste. Marie, Ont., has been awarded the contract for electrical work on a technical school to be erected at Tancred & Wellington Sts., Saulte Ste. Marie, at an estimated cost of \$225,000.

Sherbrooke, Que.

Mr. A. E. Choquette, 125a King St. W., has been awarded the contract for electrical work on a \$600,000 hospital recently erected at Sherbrooke, Que., for the Hospice du Sacre Coeur, 204, Belvidere St. E.

Sudbury, Ont.

Messrs. Grant & Hiscock, Sudbury, Ont., have been awarded the contract for electrical work on an addition to be built to St. Joseph's Hospital, Sudbury, at a cost of \$30,000.



MOTORS

A few price suggestions. Let us have your enquiries

3 PHASE, 60 CYCLE, 220 VOLTS

10-H.P. C.G.E. 900 R.P.M.	\$300.00
25- " A.G.E. 1200 "	400.00
30- " A.G.E. 1200 "	425.00

3 PHASE, 60 CYCLE, 440 VOLTS

30-H.P. A.G.E. 900 R.P.M.	\$450.00
50- " Allis-C. 1200 "	650.00
50- " Allis-C. 900 "	700.00

3 PHASE, 60 CYCLE, 550 VOLTS

2-H.P. C.-W. 1800 R.P.M.	\$ 75.00	25-H.P. C.-W. 1800 R.P.M.	\$375.00
3- " C.-W. 1800 "	90.00	25- " C.-W. 900 "	425.00
3- " C.-W. 1200 "	95.00	30- " C.-W. 900 "	475.00
5- " Wagner 1200 "	115.00	35- " C.-W. 1800 "	500.00
7½- " C.-W. 900 "	225.00	40- " C.-W. 900 "	600.00
15- " Lincoln 900 "	300.00	50- " C.-W. 600 "	850.00
15- " C.-W. 1200 "	300.00	60- " C.-W. 1800 "	750.00

All motors over 5 H. P. equipped with starters.
Motors are in good condition electrically and mechanically.

Write for catalogue covering other motors and generators, A. C. and D. C.

Gelinas & Pennock Reg'd

207 St. James St., Montreal

Canadian-Made Motors

By buying your equipment in Canada you not only save duty and exchange rates but help to keep Canada prosperous. The "Gold Band" motor we manufacture cannot be exceeded by any imported makes, as regards efficiency, dependability and long life.

We carry spare parts for our motors to insure quick service.
Used motors of all sizes also carried in stock.

Marchand Electrical Works Limited

55 COTE ST.

Phone Pl. 665-843

MONTREAL

Mr. Chatfield, Secretary - Manager

The British Columbia Electrical Co-operative Association has appointed a secretary-manager in the person of Rey E. Chatfield of San Francisco, whose time will be taken up in promoting better merchandising, accounting and the other objects of the association. The association has been looking for some time for a suitable man for this post, and found it necessary to go to the cradle of the co-operative movement, namely, California.

Mr. Chatfield is a graduate of the University of California College of Commerce, with accounting as his major subject. Following his graduation in 1914, he was connected with the firm of Chatfield & Smith, a retail merchandise concern with two stores in Sacramento Valley. From 1917 until his discharge in February, 1919, he was with the United States forces. Following this he was manager for Chatfield & Smith until September, 1920, and then entered the employ of the United States Federal Board for Vocational Training, handling all contracts for the board in the three States of California, Nevada and Arizona. In connection with his work for the Board of Vocational Education, he was successful in installing a number of accounting systems in small retail concerns and laying out merchandising plans for the proprietors. This work also brought him in touch with the California Electrical Co-operative campaign and the California Development League. Before coming to Vancouver Mr. Chatfield spent several weeks investigating co-operative conditions in Washington, Oregon and farther south. The work of the British Columbia Association will be closely tied in with that of the Northwestern Electric Service League, which recently appointed Dean Miller of the University of Washington as its manager.

Prize and Medal for "Eureka"

The Eureka Vacuum Cleaner Co., Kitchener, Ont., have received the following cablegram from their Paris, France, representative:

"Grand Prize and Gold Medal just awarded Eureka at Exposition de L'Hygiene.

The company also announces its former list of awards as follows: Grand Prize at Panama Pacific Exposition, San Francisco, Cal., in 1915. Gold Medal and Grand Prix at Inter-European Hygienic Exposition, Brussels, Belgium, June, 1920. Grand Prize and Gold Medal at Exposition Industry, Milan, Italy, July, 1920. Highest Award Diploma and Gold Medal at Ideal Home Exposition, Amsterdam, Holland, under patronage of Queen Wilhelmina, July, 1920.

"National" Dealer Helps

The National Electric Heating Company has inaugurated a "Dealer Helps" campaign which should be of great assistance to electrical dealers all over Canada making sales of "National" equipment. These helps consist both of mattes for newspaper advertisements and of folders calculated to assist the dealer himself. The newspaper advertisements speak of ranges, water heaters, toasters, stoves, hot plates, the electric iron, open hearth and mantle type grates, etc. manufactured by this company. Every electrical dealer should have a set of these helps in his possession.

The Standard Silk Robe Company

It is announced that Standard Silk Shades, Ltd., formerly operating at 265 Adelaide St. W., Toronto, is now situated at 162 Parliament St., under the somewhat similar name of The Standard Silk Shade Co. The business is under entirely new ownership and management and is, we believe, capable of serving the buying public through the electrical or furniture

trade with the highest grade of silk shades to be obtained. We had the opportunity of looking over their sample room, fitted up with both daylight and night light effects and can confidently say that we have never seen a finer display of silk lamp shades, a display that seems to do away with any necessity for Canadians to import these goods when shades of this quality can be made by our own people. We wish the Standard Silk Shade Co. success in their new business.

Ontario Contractors and Dealers—Aug. 22!

The contractor-dealers of the province of Ontario are planning a big meeting on August 22nd in Toronto. Mr. W. L. Goodwin, assistant to the president, Society for Electrical Development, and Mr. S. A. Chase have been asked to attend and address this meeting. The proceedings will open at 7.45 sharp in Room K. The secretary of the Ontario Association, Mr. McKay, states that Mr. Stalford is sending out a large number of membership applications from various points in the province. Remember the place—Room K. King Edward Hotel, Toronto.

Representative for "Sunny Suds"

Mr. T. W. Lester, St. Thomas, Ont., has been appointed representative for the Sunny Suds Washer Company to cover the territory west of London. Mr. Lester has made plans to give dealers a practical demonstration of this washing machine. He has fitted up a Ford car so that he can carry one of the machines everywhere with him and easily take it down for demonstration at the dealers' stores and replace it again in his truck. There is no doubt that Mr. Lester is not over-estimating the value of practical demonstration.

The Imperial Electric Company has been formed at 122 North Christie St., Sarnia, the members of the firm being L. H. Darbyshire and K. W. Butterworth, both men of experience in the electrical business. The Imperial Electric are carrying a nice selection of electric fixtures and are prepared to accept contracts for electrical construction and installation as well as the supply of general equipment.

Mr. C. E. MacDonald, formerly with the International Nickel Company, has been appointed in charge of the Canadian distribution for the Electrical Alloy Company, manufacturers of resistance material and Grade "A" Monel Metal, pure nickel and spark point nickel.

Cecil R. Wheaton of Saskatoon, accompanied by his wife, left Saskatoon on Thursday, the 21st July, on a motor tour to Chicago, travelling via Winnipeg, Minneapolis, and Milwaukee. Mr. and Mrs. Wheaton expect to be away about three weeks.

Mr. J. R. Young of the Sun Electrical Co. Ltd. Regina, has just returned with his family from a three weeks' motor trip through the Rocky Mountains during their holiday they stayed a few days at Banff and other well known resorts in the Mountains.

The Ward Leonard Electric Company are distributing a folder describing, with illustrations, Vitrohm Plug Rheostats for laboratory and college use. These rheostats vary in resistance from 10 ohms to 1,000,000 ohms.

The Harvery Hubbell Company of Canada, Ltd. have issued a very neat little catalogue, No. 17, in which they describe, and illustrate profusely, the great variety of electrical specialties they manufacture.

Vice-Presidents of the Canadian Electrical Association for 1921-22



A. P. Doddridge, 2nd Vice-Pres.



P. T. Davies, 1st Vice-Pres.



L. W. Pratt, 3rd Vice-Pres.

Lectured on Chippawa

A special lecture on the development of the Chippawa Power Canal was given by Mr. R. T. Jeffrey of the Hydro electric Power Commission of Ontario in the Physics Building, University of Toronto, on August 2. A large number of lantern slides and films, illustrating various phases of the work, were exhibited. Mr. Jeffrey pointed out that in one certain month a greater amount of excavation had been carried out on the Chippawa than had been done in a similar period on the Panama Canal. At the conclusion of the meeting an enthusiastic vote of thanks was tendered Mr. Jeffrey.

Keeping Japan Clean

The costly rugs, tapestries and hangings of the Siamese Legation house in Tokio, Japan, are now kept clean and their beauty preserved by a Canadian device—The Hoover Suction Sweeper. The Oriental's inherent reluctance to accept any

thing new until assured of its efficiency and economy was overcome by industrial diplomacy "national" advertising, that is international in effect. The effectiveness of this advertising caused the Siamese officials to entrust their precious household furnishings to a Hoover.

It is pleasing to note that at the Saskatoon Fair, held July 17-23, the electrical fraternity took a prominent part with their various exhibits. This is the first time the electrical men have had booths at the Saskatoon Fair, and it is to be hoped that the number of electrical exhibits will increase yearly.

Frank Streb of the Electric Shop, Saskatoon, had a very fine exhibit which attracted considerable attention. Jack Munroe, Moose Jaw, who is the Saskatchewan representative of the Dominion Light, a compact little isolated plant, had a very fine booth which he claims was a great success in every way. Lemery & Denison, Delco agents, at Saskatoon, were displaying the Delco Lighting system.



Perpetuating the Event of the Thirty-first Annual Convention of the Canadian Electrical Association in Quebec City. This Group Contains many Association Stalwarts including such Quebec Enthusiasts as A. P. Doddridge, Louis Burrill and R. B. McDunnough.

Job Factor.

Building "B"—Floor area 48,000 sq. ft.

K = $2.5a + b + 1.5c + 100$ (Abbott's Formula), where

a = 0, b = 0, c = 3.

= $0 + 0 + 4.5 + 100$.

= 104.5.

K taken equal to 105 for all buildings.

Standard cost estimated at 90c per hour.

Total Costs.

	Labor.	Material & Expense.	Total.
Estimated	\$15,577.47	\$53,008.44	\$68,585.91
Actual	14,350.66	52,559.23	66,909.85
Saving	\$ 1,226.81	\$ 449.21	\$ 1,676.06
Allowance per contract			1,500.06

Total net saving \$3,176.06

Efficiency of Workmen.

Opinion is that difference in labor for branch circuit conduit work in the two buildings was due to efficiency of workmen, even if the standard times were slightly low.

Labor Costs.

		Actual Time	% of	% of
		Total	Estimate	
Branch circuit conduit	\$5,002.73	35.05	112.2	
Feeder conduit—steel	1,335.52	9.35	101.4	
Fibre duct	544.72	3.82	192	
Branch circuit wire	2,144.95	15.02	83.5	
Large wire	872.75	6.11	58.7	
High tension cable	137.02	.96	41.3	
Cabinets	441.84	3.09		
Panel boards	510.27	3.58		
Feeder taps	144.00	1.01		
Mounting c.o. in cabinets	85.75			
Push switches	34.45		81.3	
Plug receptacles	75.84		49.6	
Switchboard "A"	267.16			
Switchboard "B"	20.11	4.46		
Switchboard high tension	350.11			
Transformers	178.79	1.25		
Pot heads (11)	37.73			
Hangers	24.50			
Fire pump h.t. panel	35.71			
Elevator switches and panels only				
operating building	28.14			
Recept. in train sheds	23.40			
Cleats in cable support boxes	16.75			
Float switch	14.97			
1-50 h.p. compensator	18.80			
Connecting 60 h.p. motor	1.75			
Setting manhole frames	62.21			
Drill holes	161.65			
Pierce bolts	85.21	2.16		
Drill 27-1 in. holes—10 in. concrete slab	61.88			
Paint conduit	16.13			
	\$12,740.58	85.86		
Misc.	29.50	.20		
Unaccounted for	288.51	2.02		
Handling material	554.68	3.88	(1.06%	
		of cost of mtl.)		
Time keeping, etc.	664.69	4.66		
	\$ 1,537.38	10.76		
Total	14,277.96	96.66		
Items not figured		3.34		

Branch Circuit Conduit.

C indicates ceiling outlet.

5 C indicates a $\frac{1}{2}$ in. pipe entrance to a ceiling outlet.7 C indicates a $\frac{3}{4}$ in. pipe entrance to a ceiling outlet.

1 C indicates a 1 in. pipe entrance to a ceiling outlet.

W. indicates wall outlet.

5 W indicates a $\frac{1}{2}$ in. pipe entrance to a wall outlet.7 W indicates a $\frac{3}{4}$ in. pipe entrance to a wall outlet.

1 W indicates a 1 in. pipe entrance to a wall outlet.

Building "B."

	Operation.	Quantity.	Estimated Minutes ea.	Estimated Total Min.
Class A. floor	C	609	9.3	5,635
	5 C	846	10.7	8,164
	7 C	321	12.6	3,880

Suspension ceiling	1 C	7	21.3	341
on 1st floor	C	12	15.8	190
	5 C	10	43	430
	7 C	13	50	650
Suspension ceiling	C	53	15.8	827
on 3rd floor	5 C	74	18.8	1,374
	7 C	19	20.7	396
Class J-K walls	W	454	21.6	10,000
	5 W	867	38	32,910
	7 W	147	44	5,060
	1 W	12	59	708
$\frac{1}{2}$ " conduit		24,262'	.68	17,088
$\frac{3}{4}$ " conduit		10,183'	.89	9,211
1" conduit		354'	1.26	328

Plus 5% (job factor)	4,889
Total estimated minutes	102,667
Total estimated hours	1,711
Total actual hours	2,202

Actual hours, 128.7% of estimated hours.

Actual cost	\$2,007.79
Estimated cost—1,711 hours @ 90c.	1,539.90

Loss	\$467.89
----------------	----------

Estimated cost per hour	\$.90
Actual cost per hour	91.1c 2,007.79

\$2,202

Building "A."

All Class A floors—Class J-K walls.

	Operation.	Quantity.	Estimated Minutes Each.	Estimated Total Min.
	C	2,161	9.3	19,780
	5 C	3,251	10.7	34,920
	7 C	591	12.6	7,710
	1 C	400	21.3	8,570
	W	369	21.6	8,015
	5 W	645	38	21,280
	7 W	49	44	1,936
	1 W	202	59	13,100
$\frac{1}{2}$ " conduit		41,865	.68	28,470
$\frac{3}{4}$ " conduit		8,345	.89	7,610
1" conduit		15,330	1.26	19,850

173,911

Plus 5% (job factor)	8,690
--------------------------------	-------

Total estimated minutes	182,607
Total estimated hours	3,043
Total actual hours	3,075

Estimated hours for recorded quantities, 3.041.

Actual hours, 101.1% of estimated hours.

Actual cost	\$2,862.90
Estimated cost—3,043 hours @ 90c.	2,738.70

Loss	\$124.20
----------------	----------

Estimated cost per hour—90c.

Actual cost per hour—93.1c.

District Representatives

The Ontario Association of Electrical Contractors and Dealers have set in motion a vigorous membership campaign. For this purpose, and also to facilitate organization, the province of Ontario has been divided into districts, and district representatives have been appointed. As noted elsewhere in this issue, Mr. V. K. Stalford is touring the southwestern section of the province, meetings having been arranged almost daily from August 2 to August 19. As we go to press we are just in receipt of reports of a couple of these meetings, which will be found elsewhere in this number. The district chairmen appointed are as follows:

Brantford, C. A. McLean; Guelph, G. E. B. Grinyer Galt, E. B. Fewings; Hamilton, W. G. Jack; Kitchener, F. O. Ellis; London, L. R. Folley; Ottawa, H. L. Allen; Peterborough, J. H. Miller; Niagara Falls, W. F. Carter; Stratford, H. S. Peter; Sarnia, F. Chambers; St. Catharines, J. H. Sandham; Toronto, E. A. Drury; Windsor, V. B. Dickeson; Woodstock, E. S. Coppins.

Vigorous Campaigning for Membership

Mr. K. A. McIntyre, chairman of the Ontario Association of Electrical Contractors & Dealers, has sent out an interesting appeal to Ontario members and members-in-prospect to co-operate in every way possible with Mr. Stalford, who has been appointed special representative and has taken temporary active charge of the work of organization. Make the work as easy as you can for Mr. Stalford. Arrange meetings and get your members together so that the formation of sections of the Ontario Association may be discussed and the advantages outlined before the greatest possible number of interested persons. The organization of the province is going forward nicely, but a little too slowly. Give Mr. Stalford your assistance to speed up the work.

A Typical Meeting

The electrical contractors and dealers of Kitchener, Waterloo, Preston, Heseler and Galt held a meeting at the Wagner Inn at Bridgeport on Friday, August 5, 1921. Dinner was served at 7.00 p.m. Frank Ellis, of Kitchener, acted as chairman of the meeting. V. K. Stalford and K. A. McIntyre addressed the meeting on Association matters. At the conclusion of the addresses, the chairman, in a few remarks, advised every firm represented to join the Association. Eight of the firms represented submitted their applications and several more only asked a little time to consider the matter.

Representatives of the Hydro Commissions of Kitchener and Waterloo were in attendance at the meeting, which is an indication of the friendly relations existing between the local contractor-dealers and the central stations. At the conclusion of the meeting everybody present expressed himself as being very anxious to see the association work carried on in the district. The spirit of goodfellowship and enthusiasm in evidence at the meeting would indicate that the Kitchener district will have a very fine district organization of the Ontario Association of Electrical Contractors and Dealers.

The chairman closed the meeting by a vote of thanks and appreciation for the assistance of Messrs. McIntyre and Stalford. Mr. Ellis proved to be a very capable chairman and toastmaster. The following firms had representatives at the meeting: Ellis & Howard, Kitchener; The Doerr Electric, Kitchener; The Star Electric, Kitchener; Chas. F. Schmidt, Kitchener; Oscar Thal, Kitchener Light Commission; Mr. Briddick, District Electrical Inspector; N. H. Hagen, Kitchener; Mallett & Bierwagen, Kitchener; Electric Service Co., Waterloo; Wm. Reiber, Waterloo; Electric Shop, Waterloo; Geo. Gross, Waterloo Light Commission; Wm. Dakin, Galt; E. Fewings, Galt Gas & Electric Fixture Co., Galt; Beattie-McIntyre Co., Ltd., Toronto; V. K. Stalford, Hamilton.

Attended the National Convention

A good sized contingent of Canadians attended the convention of the National Association of Electrical Contractors and Dealers in Buffalo on July 19-20-21, among whom were the following well-known contractor-dealers: R. A. L. Gray; E. A. Drury; Mr. Taylor, of Taylor Bros., (and Mrs. Taylor); K. A. McIntyre; J. A. McKay; S. Warman; Mr. Hazlett, of Masco Company; Art. Wilson, of Earle Electric Company; B. Balment; Messrs. Curran & Salisbury, of Salisbury Electric Company; Sam. Wood; Mr. Stiles and Mr. Ostrom, all of Toronto. Mr. Ellis, of Kitchener; Mr. Grinyer, of Guelph; Mr. Stalford, of Hamilton; Mr. McLean and Mr. Henderson, of Brantford.

The Toronto Transportation Commission has made a start on street railway construction, work having commenced on Coxwell Avenue.

Quebec Contractor-Dealers Discuss Installation of Externally Operated Switches

The members of the Electrical Contractor-Dealers' Association of the Province of Quebec (English Section), Montreal, held a meeting on August 1 at the offices of the Electrical Co-operative Association, Province of Quebec, Drummond Building, Montreal. Mr. J. M. Walkley presided.

The object of the meeting was to discuss proposed changes in the details of the installation of externally operated switch boxes at entrance points, with the object of overcoming difficulties encountered by the local power companies in installing their meters. A form of construction was submitted to the members by Messrs. E. Craig (Montreal Light, Heat & Power Consolidated) and L. H. Marotte (Montreal Public Service Corporation), which can be followed with any make of entrance box. A sample installation was shown to the members, and described in detail by Mr. Craig.

The first requirement was to have a continuous conduit from the exterior of the building to the inside of the switch box without any conduit, with removable covers. The next was to have the externally operated switches so placed that there would be sufficient room to instal the meters close to the enclosed entrance switch. It was further stated by Mr. Craig that, as the power companies are figuring on a meter to be connected by conduit to the entrance switch, it was desired that the contractor-dealers, in providing their meter loop, should enclose the line wires in a piece of conduit about three in. long to be adapted to one side or the other of the switch box, near the bottom.

Mr. C. Tate, chief electrical inspector, Canadian Fire Underwriters' Association, assured the meeting of the willingness of his department to co-operate should the changes suggested involve any modification of the Underwriters' rules.

Mr. J. A. Anderson was of opinion that the power companies should take steps to stop tampering with their apparatus. At a recent meeting of the French-speaking section it was stated that employees of one of the power companies did work which was outside their duties and collected money for it, thus robbing contractor-dealers of work which properly belonged to them. If the public tampered with the apparatus the contractor-dealer should do the necessary work.

Mr. Craig replied that employees who did work outside their duties were liable to be dismissed. His company had no desire to do work which belonged to the contractor-dealer. He would warn the employees against doing work of this character.

In the course of further discussion Mr. Tate stated that the object was to protect both the public and the power companies.

Mr. Anderson drew attention to the article on "Safeguarding the Users of Our Household Electrical Appliances," by Mr. W. C. Cale, in the July 15 issue of The Electrical News. He read extracts from the article, and asked if anything of the nature suggested was being done in Montreal.

Mr. Tate replied that conditions in Montreal were different from those referred to.

On the motion of Mr. W. B. Shaw, seconded by Mr. Clarence Thomson, the meeting concurred in the suggestions made by the representatives of the power companies, and agreed to make the installations conform to the proposed requirements.

The suggested changes are to be submitted to the Fire Underwriters for their approval, with a request that amendments in the rules be passed by them to this effect.

The French section held a meeting on the evening of the same date, when the subject was discussed. Messrs. Craig, Marotte and Tate were present. A resolution on similar lines to that agreed to by the English section was passed. Mr. N. Simoneau presided.

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16

Engineering Projects at Hong Kong.

Tenders have already been invited for a reclamation scheme at Hong Kong which involves the reduction of Morrison Hill, at the eastern end of the city, and the filling in of tidelands near the heart of the business section. Some 3,300,000 cubic yards of earth will be handled and about 90 acres of land reclaimed from the sea, in addition to the land made usable by reduction of the hill. The fill to be made, states the Trans-Pacific, will involve the construction of a sea wall about a mile in length, from which piers and docking facilities of concrete and stone will extend into the sea. The cost of the completed work, including drainage facilities and piers, is roughly placed at \$3,500,000. A movement is on foot to provide for the completion of the final section of the Canton-Hankow Railway, and a foreign loan of \$15,000,000 has been suggested. The

present section is cut off from the principal lines of China, which all lie to the north, a fact which robs Canton and Hong Kong of the advantages of connection with a great railway system. It has been intimated that extensive additions to the buildings and equipment of Hong Kong University will soon be made, though no definite construction program has yet been planned.

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" 1	75	3	25	550	480		Westg.
" 1	60	3	25	550	750		Cr. Wh
New 2	52	3	25	550	720		Lanc.
Used 1	50	3	60	550	970		Westg.
Used 2	50	3	25	550	720		Westg.
New 2	35	3	25	550	720		Westg.
Used 1	30	3	25	550	1500		Tor. & Hm.
" 2	30	3	25	550	750		F.M.
Used 1	25	3	25	550	750		C. G. E.
New 1	25	3	25	550	715		Lanc.
New 1	15	3	25	550	1450		Westg.
" 1	15	3	25	550	750		Lincoln
" 3	15	3	25	550	720		Westg.
New 2	13	3	25	550	700		Lanc.
Used 1	7 1/2	3	25	220	1500		Tor. & Hm.
" 1	7 1/2	3	25	550	1450		C. G. E.
New 1	7 1/2	3	25	550	725		Westg.
Used 1	7 1/2	3	25	550	700		Lanc.
New 1	5	3	25	550	1440		Excelsior
Used 1	5	3	60	200	1120		Westg.
New 3	3	3	25	550	1500		Lanc.
" 4	3	3	25	550	1400		Westg.
" 4	3	3	25	550	1400		Excelsior
Used 1	2	1	60	110	1750		Wagner
New 2	2	3	25	550	1500		Lanc.
New 2	2	3	25	550	1440		Excelsior
" 2	2	3	25	550	1425		Lanc.
New 1	2	1	25	110	1400		Wagner
" 1	1 1/2	1	25	110	1420		Wagner
New 1	1	1	60	110	1725		Wagner
Used 1	1	3	25	220	1500		Tor. & Hm.
Used 1	1	1	25	110	1460		Wagner
New 1	1	1	25	110	1440		Wagner
" 1	1	3	25	550	1425		Lanc.
Used 1	1	3	25	220	710		C. G. E.

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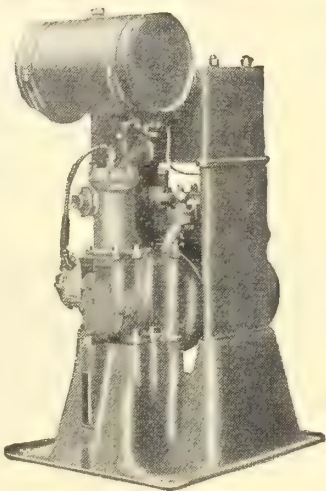
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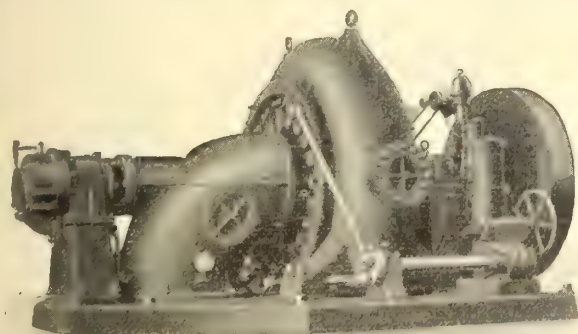
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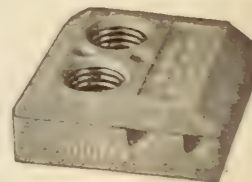
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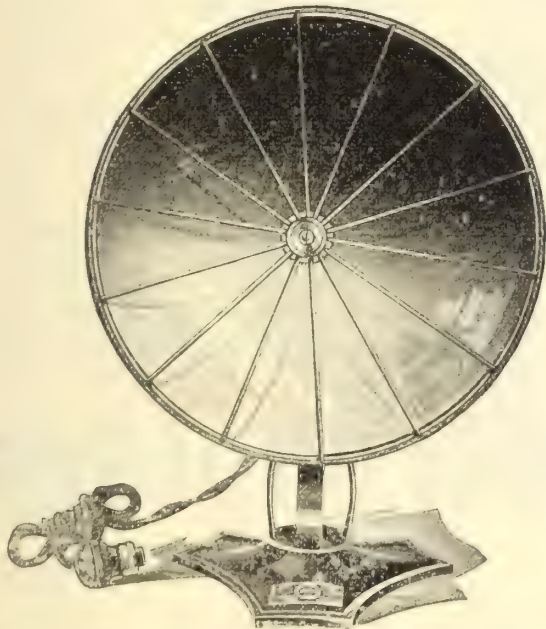
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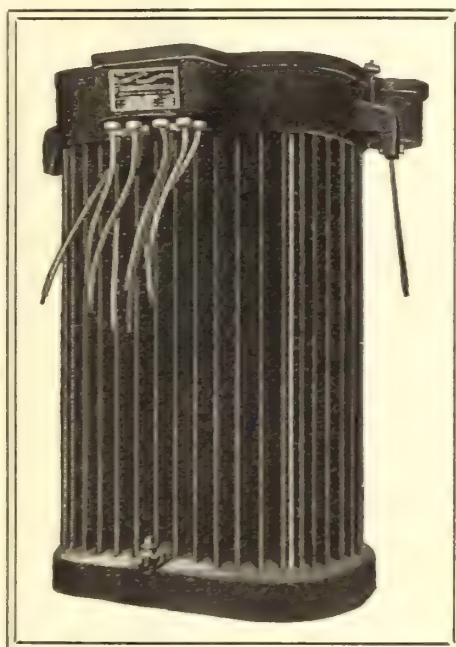
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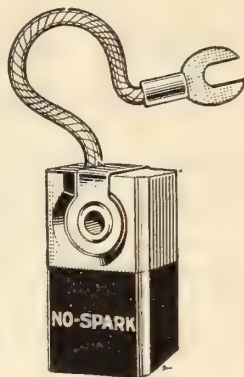
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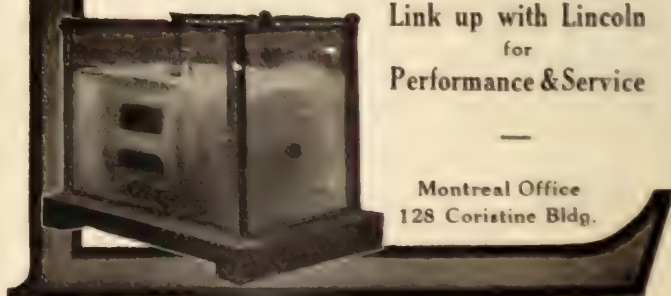
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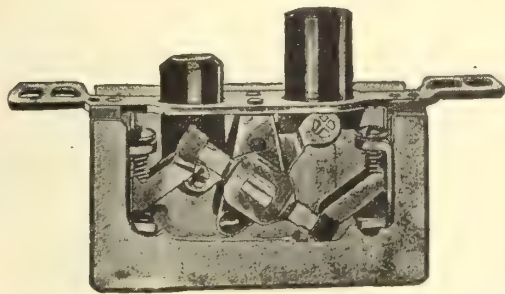
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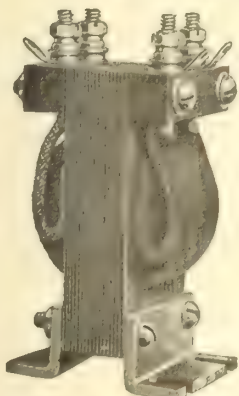
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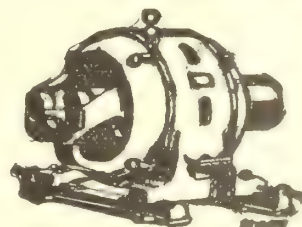
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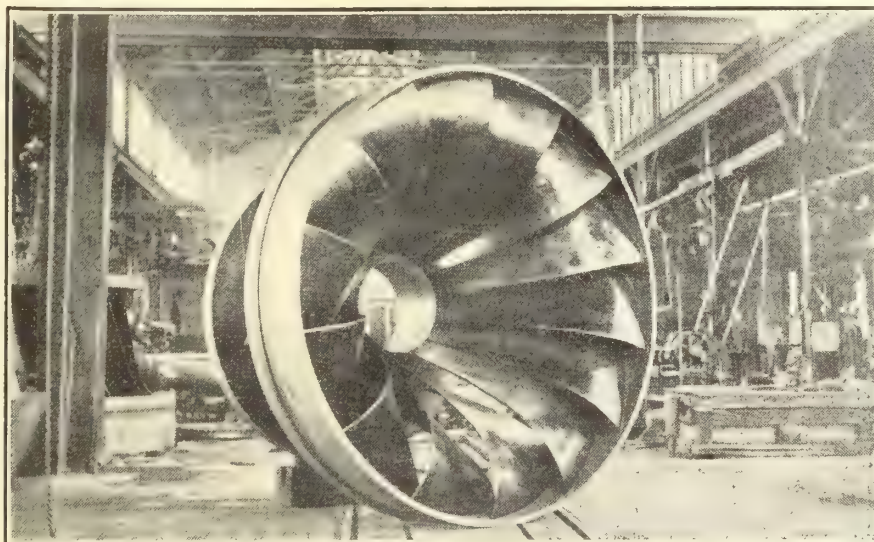
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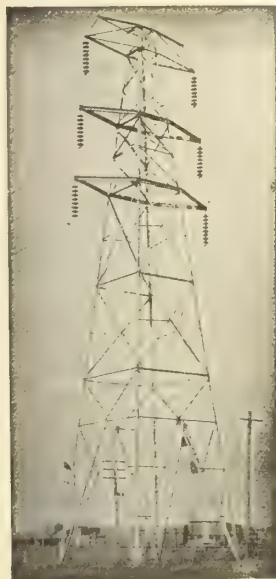
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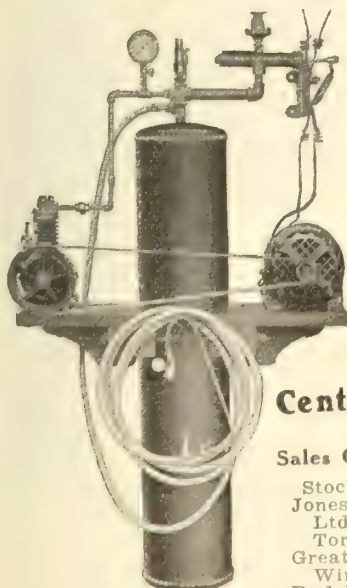
Let us send our list.

McGill Mfg. Co.
Valparaiso - - Indiana

FRACTIONAL HORSE POWER

Century

Repulsion Start Induction SINGLE PHASE MOTORS 1 10 to 14 H.P.



develop a static tor-
que of not less than
350% of full load tor-
que, which is partic-
ularly desirable for
the operation of ap-
paratus requiring an
unusual effort at
starting, for illustra-
tion — Pumps, Car-
bonators, Refrigerat-
ing Machines, etc.

Century Electric Co.
St. Louis, Mo.
Sales Offices in Principal Cities

Stock carried in Canada by:
Jones & Moore Electric Co.,
Ltd., 294 Adelaide St. W.,
Toronto.
Great West Electric Co., Ltd.,
Winnipeg.
Rudel-Belnap Machinery Co.,
Ltd., 157 Shaughnessy Bldg.,
McGill Street, Montreal.
Rankin & Cherrill, 55 Hastings
St. W., Vancouver, B.C.

1/2 H.P. motor mount-
ed on an Air Com-
pressor. Other sizes
up to 40 H.P.

REALITE

PATENTED JULY 23, 1921



No. 2609

*"Makes Dark Places Light
and Light Places Lighter"*

Actual Tests Prove Realite the Most Efficient Lighting
Unit on the Market

MADE IN CANADA BY CANADIAN WORKMEN

Ask for Descriptive Realite Folder

Tallman Brass & Metal Limited
HAMILTON, ONT.

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED

SPECIAL HEATING APPLIANCES

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Renfrew Electric Company

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Minimax Electric & Mfg. Co.
Northern Electric Company

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Hoover Suction Sweeper Co. of Canada, Ltd.
Houston & Company
McDonald & Willson, Ltd., Toronto
Northern Electric Company

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Spielman Agencies, Registered

WASHING MACHINES

Altorfer Bros.
BlueBird Corporation, Ltd.
Connor & Son, J. H.
Henderson Business Machines, Ltd.
Hurley Machine Company
McDonald & Willson
Meyer Bros.
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Slade Mfg. Co.

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Barber & Sons, Chas.
Smith Company, S. Morgan

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Lincoln Electric Company of Canada

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Boston Insulated Wire & Cable Company, Ltd.
Canada Wire & Cable Company
International Machinery & Supply Co.
McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited

WIRING DEVICES

Hatheway & Knott, Inc.
Northern Electric Company

WOOD SCREWS

Robertson Mfg. Company, P. L.

WRINGERS (Power)

BlueBird Corporation, Limited
Meyer Bros.



BAKELITE
DILECTO

Where Only the Best is Used

BAKELITE-DILECTO is taking the place of mica, rubber, wood, etc., for insulating and mechanical purposes because of its extraordinary dielectric and tensile strength. Get particulars.

Bakelite-Dilecto, Vulcanized Fibre, and Continental Bakelite in sheets, rods, tubes and special shapes, and Conite in sheets or roll: from .005" to .026" thick.

The Continental Fibre Co., Newark, Delaware

Pittsburgh Office: 301 Fifth Ave.
New York Office: 233 Broadway
Chicago Office: 332 S. Michigan Ave.
San Francisco Office: 525 Market St.; Los Angeles Office: 411 S. Main St.

CONTINENTAL

BENSON-WILCOX ELECTRIC CO.

LONDON - - CANADA

DISTRIBUTING JOBBERS

Try Us for Service

ELECTRICAL SUPPLIES
FIXTURES-MACHINERY

MOST COMPLETE Stock IN CANADA

Much for Little !

2 DIPS OF "OHMALINE"

1,200,000

MEGOHMS RESISTANCE

This is not a solitary
STARTLING EFFECT

but what you may get
every time you use

"OHMALINE"
INSULATING VARNISH

See Booklet E32

SPIELMAN AGENCIES, (Regd.)
45 St. Alexander Street - MONTREAL

Ottawa, J. W. Anderson, Bank Street Chambers
Toronto, Henry Engineering Co., 89 Wellington St. W.
Winnipeg, William A. Goold, 39 Charlotte Street
Halifax, Dodwell & Piers, Roy Building.

COMING !

A M

Solderless-Tapeless
Wire Connectors

G. W. Axtell & Company
Sarnia Ont.

"PITTSBURGH"

The
Scientific
Show Window
Reflector



Illustration shows "Pittsburgh"
Reflector No. 100, for 100 or
150 Watt Lamp. Dimensions:
Height 8 inches, width 8½
inches, holder 2¼ in. Form "O."

It reflects and con-
trols the light to give
the greatest possible il-
lumination to the ob-
ject. The "Pittsburgh"
Reflectors, by scientific
construction and test

give the maximum result from your lighting, and will
pay for their small cost in saving of current. Don't
fail to write for our folder on lighting efficiency.

**Pittsburgh Reflector and
Illuminating Co.**

PITTSBURGH, PA.

Canadian Distributors

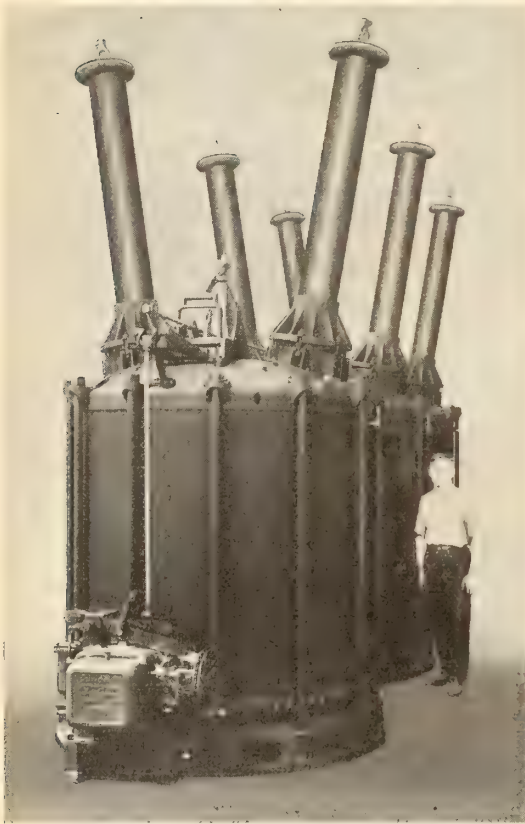
JAMES DEVONSHIRE, LTD.

701 Yonge Street,

Toronto

Westinghouse

Oil Circuit Breakers for Queenston



500 A. 135,000 V. "GA-4" Circuit Breaker. All (20) of the Queenston H. T. Breakers are Westinghouse "GA-4"

In the new super-power station of the Hydro Electric Power Commission of Ontario, at Queenston, with an ultimate installation of 8-45,000 Kv-a. units, the possible short circuit conditions will be extremely severe, and reliable circuit breaker performance is of primary importance.

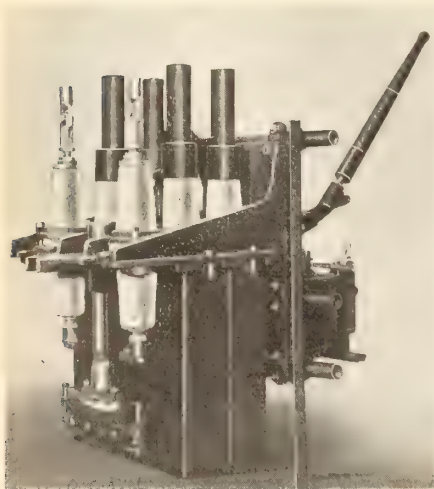
It is therefore highly significant that over 75% of the total number of circuit breakers for this application will be furnished by Westinghouse.

All of the outstanding features in the designs are those which, as embodied in standard Westinghouse breakers, have demonstrated their worth in industrial and central station service for years.

It is worthy of note that these circuit breakers, which are among the largest in the world, for use in the largest single power plant in the world, are a Canadian product, being manufactured entirely in Canada.



135,000 V. Condenser type Terminal Bushing.



600 A. 15,000 V. Type "B-2" Circuit Breaker showing hand closing lever. ALL Queenston service breakers are Westinghouse "B-2"



3,000 A. 15,000 V. Type "C-4" Circuit Breaker as used for main generators and bus-ties on L.T. side.

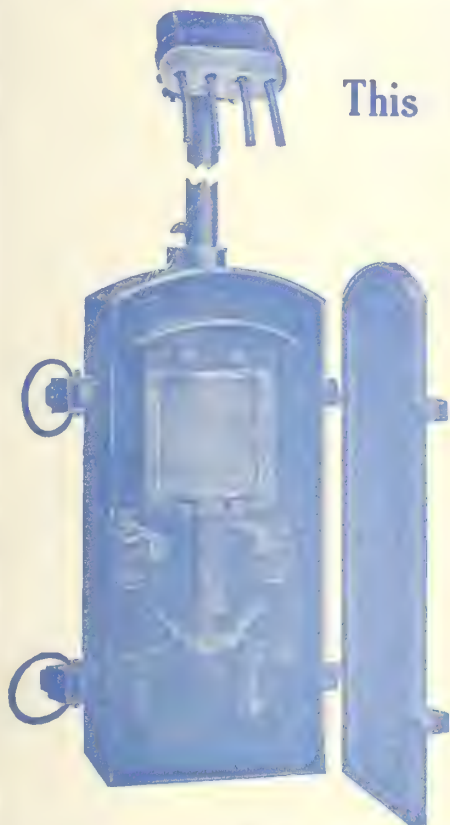
Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.





This **SOLENOID SWITCH** has been adopted
by the Hydro Electric Commission

They use it for

STREET LIGHTING

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

Write for complete descriptive particulars

The **Electrical Maintenance & Repairs**
Company, Limited

Phone
Adelaide
902-903

162 Adelaide Street West
TORONTO

Nights
Beach
1723-1930

Made in Canada
Conduit

Electrical Wiring
Made Safe

XCELADUCT
(GALVANIZED)

For All
Electrical
Installations

Manufactured by
National Conduit Co., Limited
Toronto

Sales Agents for Manitoba and Saskatchewan—Filer-Smith Machinery Co., Limited, Winnipeg.

White's Porcelain Trolley Hanger

is more easily installed and more satisfactory in service

The insulator, stud and yoke are separable, yet they assemble as a unit. When the trolley ear is attached and screwed up firmly on the stud, it can be twisted around at right angles to the span wire without loosening the ear on the stud. The head of the stud is countersunk into insulator so it can't turn after the ear is set in proper alignment. The insulator is made of durable glazed porcelain. The yoke is galvanized iron, the stud sherardized steel. White's Porcelain Hanger is extremely durable, safe and low in cost and WE CAN SHIP AT ONCE.

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 PINE STREET, ST. LOUIS, MO.

Our Newspaper Campaign has developed an increased demand for:—



C-6 Range

National ELECTRIC Appliances



A-4 Range

ARE YOU GETTING YOUR SHARE OF THIS BUSINESS?

The National Electric Heating Company

544-548 Queen Street East, TORONTO, Canada

LIMITED

249 Mountain St., Montreal

627 Vancouver Block, Vancouver

52 Albert St., Winnipeg



EO5 Range



One Burner Hot Plate



Two Burner Hot Plate



Water Heater

Electrical

News

Engineering Contracting Merchandising Transportation

Century

Repulsion Start Induction SINGLE PHASE MOTORS



Are built to give constant service under severe operating conditions with practically no attention. They are so efficient and quiet in their operation that many machinery manufacturers are today specifying them as part of their equipment.

—RATINGS—
1/10 to 40 Horse Power

Century Electric Co.

St. Louis, Mo.
U. S. A.



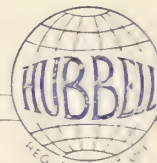
Condulets



Conduit Fittings



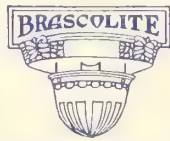
Wiring Devices



Square D Safety Switches



Flashlights



Lighting Fixtures



Protective Switching Apparatus



Electric Signal Apparatus



Trade-marks Representing Quality Products

IT GIVES us genuine satisfaction to be associated with the companies represented by these well-known trade-marks.

Each trade-mark stands for a quality product of the highest grade that has long since established its worth wherever electrical work is done.



Electrical Signaling Apparatus



Whitcomb & Fittings



Switchboard & Protective Fittings



Control Apparatus



Wiring Devices



Shawmut Fuses

Northern Electric Company LIMITED

MONTREAL	OTTAWA	WINDSOR	CALGARY
HALIFAX	TORONTO	WINNIPEG	EDMONTON
QUEBEC	HAMILTON	REGINA	VANCOUVER



Wiring Devices

CANADA



10 Years from To-Day

Where Will You Stand?

Will you look back over the past with regrets at the mistakes you have made or will your business be in a strong financial position to enable you to take life a little easier and to look backward with satisfaction.

IT ALL DEPENDS ON YOU

If you are one of the many Contractor-Dealers who are GUESSING—who ignore such important matters as OVERHEAD EXPENSE and PROFIT and whose sole object is *getting work* away from your competitor, regardless of price, you will see your mistake too late and will have no one to blame but yourself.

USE THE HENDERSON BUSINESS SERVICE

True—you may not get all the business in your territory, but you WILL GET A REASONABLE SHARE of it and most important of all—you *will* make a decent profit, a portion of which can be laid aside for the future.

ITS NOT TOO LATE

If your business has not produced the profit you expected during the past few years—forget the past—start now. Place your business on a good sound basis by adopting the Henderson Business Service. Hundreds of others have been using it for four years and many of them tell us they never made any money until they adopted it.

MAIL THIS COUPON — FIND OUT—

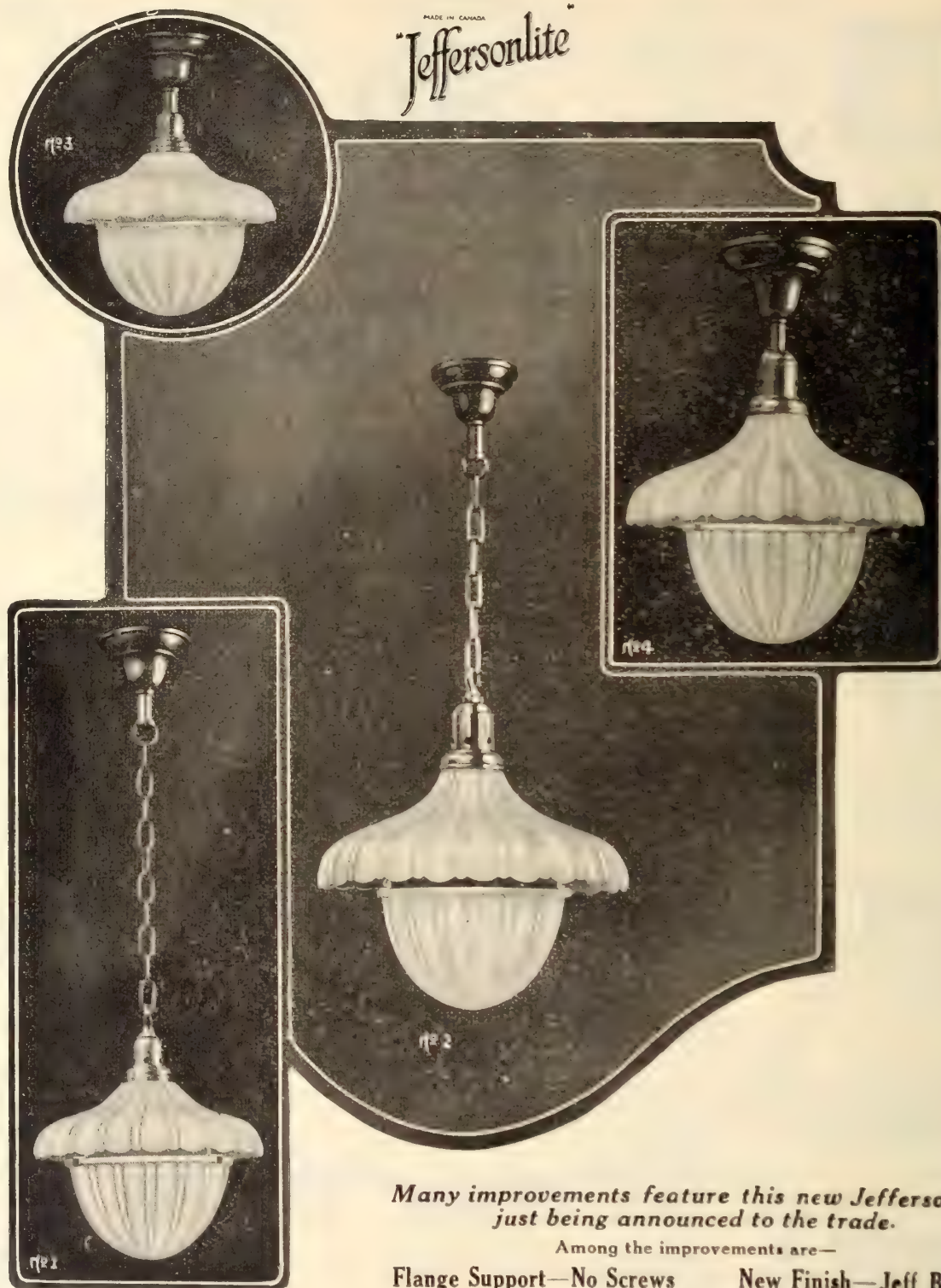
Henderson Business Service, Ltd.
Box 123, Brantford, Ont.

Send me your Booklet "Ten Reasons Why"

Name _____

Address _____

City or Town _____



Many improvements feature this new Jeffersonlite just being announced to the trade.

Among the improvements are—

Flange Support—No Screws New Finish—Jeff Bronze
New Bowl—New Adjustable Socket Holder
New Hangers New Package—Individual Cartons

New Prices. Write for New Supplement Catalogue.

We extend an invitation to all the Electrical Trade to visit our Bay St. Showrooms while at the Exhibition in Toronto.

JEFFERSON GLASS COMPANY, LIMITED

Head Office and Factory: 388 CARLAW AVENUE, TORONTO

Branches: 285 Beaver Hall Hill, MONTREAL 164 Bay Street, TORONTO 272 Main Street, WINNIPEG



A good splice deserves a good tape

A WIREMAN can go the limit on a tight, well-served splice, but it isn't a good job, unless the tape is as good as the splice it covers.

Johns-Manville Friction Tapes

Johns-Manville Friction Tapes are made of strong, closely-woven fabric, heavily impregnated. They have remarkable adhesive properties and long life. Heat, cold and moisture do not affect them and they do not dry out with age. They contain nothing to corrode wires. Close observation shows our tapes are free from pin-holes, lumps and thin spots and have exceptional insulating efficiency. They contain the maximum yardage per pound.

Johns-Manville Friction Tapes are $\frac{3}{4}$ -inch wide and are put up in standard 4-oz. and 8-oz. rolls, wrapped in tin-foil and packed in strong manila paper cartons.

Johns-Manville Jomanco Friction Tape

Gray in color. Highest grade friction tape on the market, used for general outdoor work where the highest class of insulated joint is required. It has never been known to fail under the most exacting service. Has withstood 100 volts per mil.

Johns-Manville No. 3 Friction Tape

Recommended for taping motor leads, switchboards and inside wiring where a good insulation is required. Strong in friction, possesses high heat-retarding qualities and dielectric strength.

Johns-Manville No. 5 Friction Tape

Especially adapted to inside work.

Johns-Manville White Friction Tape

Recommended where the use of white tape is desirable.

Johns-Manville Armature Tape

For winding armatures, field coils, etc.

Johns-Manville Rubber Splicing Compound

Johns-Manville Rubber Splicing Compounds, when applied, form a homogeneous mass without the aid of heat, making a strong watertight joint that lasts indefinitely.

They are uniform in thickness throughout—no lumps or thin spots.

Johns-Manville Alpha Rubber Splicing Compound

This is our highest grade splicing compound. Absolutely perfect joints, that are impervious to moisture and stronger dielectrically and mechanically than the wire insulation, can be made with Johns-Manville Alpha. Will withstand a test of 300 volts per mil.

Johns-Manville Brooklyn Rubber Splicing Compound

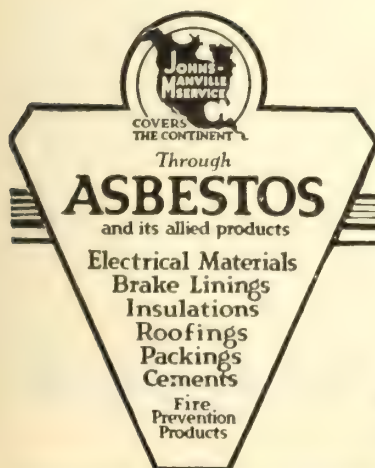
A good splicing compound recommended for low voltage work.

We will replace without cost, any tape (except white) found defective within one year from date of manufacture.

Johns-Manville Friction Tapes and Splicing Compounds are carried in stock by all Johns-Manville Distributors and Jobbers. You can get service from local stocks.

Canadian Johns-Manville Co., Ltd.

Toronto Montreal Winnipeg Vancouver
 Windsor Hamilton Ottawa



JOHNS-MANVILLE ELECTRICAL MATERIALS



Why the Sovereign Electric Iron is a Profitable Article from the Dealers' Standpoint

FIRST of all, it is made right. The construction leaves nothing to be desired. You can rest assured that it will always do you credit in the possession of your most fastidious customers.

Second, the price is right. The new list price of \$6.00 with particularly generous discounts, make it a profitable article to merchandise.

Third, its nationally advertised. Thousands of housewives all over Canada, see and read Sovereign Iron advertisements. We will supply you with a complete advertising campaign. Let us know your requirements. Address the Advertising Department, Head Office, Toronto.

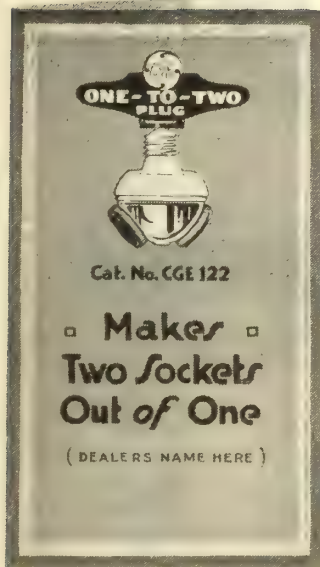
MADE IN CANADA

Canadian General Electric Co., Limited
HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.



Attract Attention - Arouse Interest - Stimulate Desire



The Three Functions of a Good Display

THE C. G. E. One-To-Two Plug, conforming to the C. G. E. merchandising policy of packing wiring devices in individual and artistically labelled cartons, is meeting with an enthusiastic reception everywhere.

C. G. E. Wiring Devices, with their distinctive orange and blue labels, practically sell themselves. For example, by dressing your window with One-To-Two Plugs you cannot help but develop an excellent display, which will have its effect on your cash register. The striking design of the carton showing the adaption of the plug, to one or more of its many uses, and the message that it makes "Two Plugs out of One" will attract attention—arouse interest and stimulate desire.

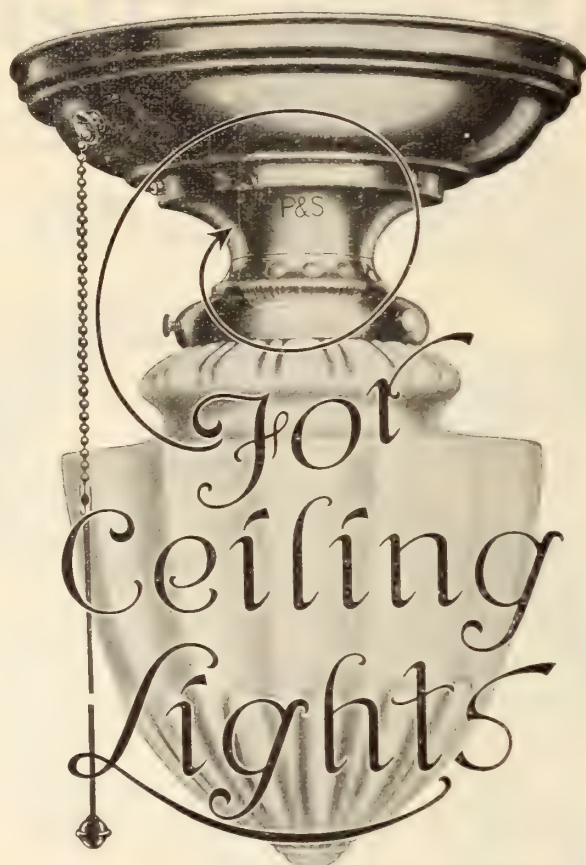
A supply of imprinted folders will be forwarded upon request.

Canadian General Electric Co., Limited

HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

*The Arrow
Points at the
Receptacle*



*Send for a
Sample of
P&S 998
Now*

Let us send you a free Sample
because these Receptacles are selling at this time

Fixture Men and Electrical Contractors
are Buying P&S 998 and 427



P&S 998

Easy to buy
Quick to use
For Quick Sales

Make a Snappy Bed-room Light
with 998 or 427



P&S 427

*Only a few folders left—
Write today for Ceiling Light Folder*

PASS & SEYMOUR, Inc.
SOLVAY NEW YORK



A Galvaduct Building

Warehouse at Turcot, adjacent to Montreal.

Property of the Imperial Tobacco Co.

Electrical Contractors:---The MONTREAL ELECTRIC Co., Limited.

Galvaduct Loricated

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Always specify GALVADUCT or LORICATED CONDUITS

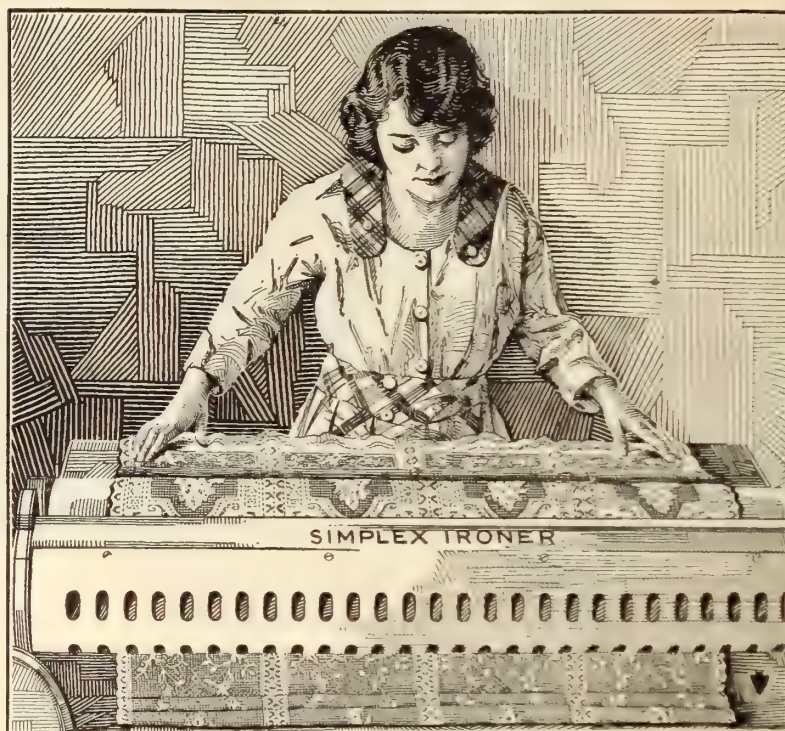
If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg



Saleability

There can be no doubt about the selling possibilities contained in these "Simplex" Ironers.

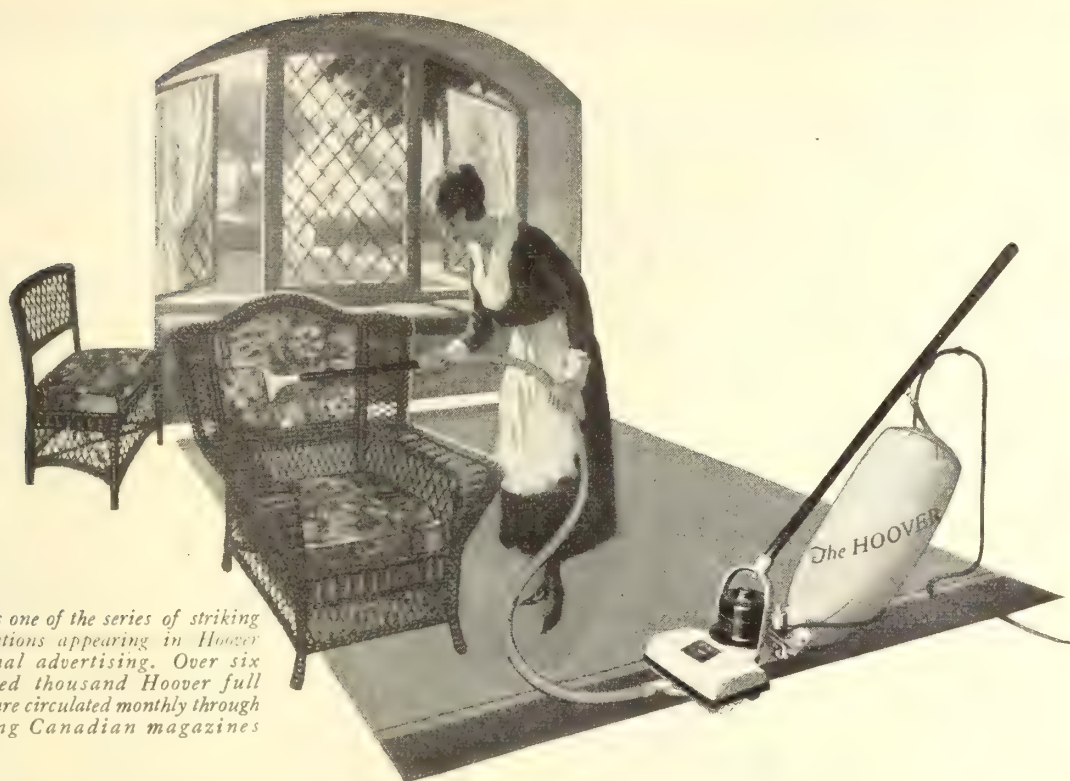
Their splendid construction and high-grade materials insure a long service. And this, together with the fact that they fill a real need, quickly wins over the busy housewife. In addition we render every possible help to the dealer in the way of window cards, folders and newspaper cuts.

It is an opportunity no electrical merchant should overlook. Write and let us send you full particulars. Prices will appeal to dealer and consumer.

Canadian Ironing Machine Co., Limited
Woodstock Ontario

SIMPLEX IRONER

"THE BEST IRONER"



This is one of the series of striking illustrations appearing in Hoover national advertising. Over six hundred thousand Hoover full pages are circulated monthly through leading Canadian magazines

The Hudson's Bay Company Did a \$22,055 Hoover Business Last Year at Vancouver on the Resale Plan

The opportunities that exist to sell Hoovers in quantity are excellently illustrated by the success of the Hudson's Bay Company at Vancouver with a population of 124,000.

This big department store, as do many other of our dealers, operates on the Hoover Resale Plan—an arrangement under which we secure leads, demonstrate, sell and service Hoovers in co-operation with the store, thereby supplying the dealer with a retail organization trained to get and to care for a large volume of business on Hoovers.

As a result, 289 Hoovers, plus many sets of attachments, were disposed of through this Hudson Bay store in 1920.

Demonstrations were regularly conducted both on their main floor and in the carpet department, while window displays and newspaper advertising were used consistently.

This year their sales will exceed those of 1920.

They find, as all Hoover dealers do, that The Hoover attracts desirable new patronage, as well as cements the relationship with old customers, and therefore it is a valuable asset to any store aside from the direct profits.

The Hoover and the Hoover Resale Plan are gaining every day. Are you willing to consider them now?

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and General Offices: Hamilton, Ontario

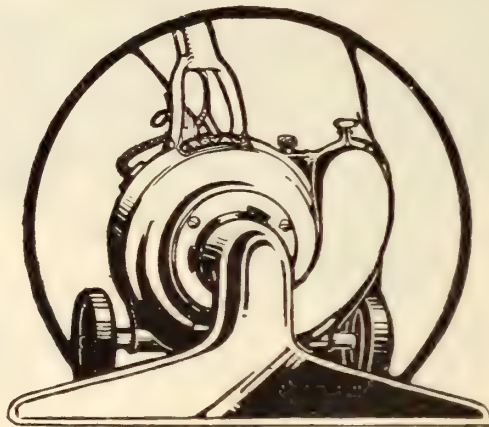
The HOOVER

It Beats... as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

Keep Your Eye on the Bull's-Eye of Business

Of all sweet words,
Whether English or Czech,
The sweetest are these—
“Enclosed find check.”



SATISFACTORY merchandise is paid for promptly—and the prompt collection of money due is the aim of every man in business. For success is measured not in what is due you, but in what you've got. Electrical merchants who handle the

ROYAL
QUALITY SERVICE

ELECTRIC CLEANER

Cleans by Air-Alone!

have the minimum trouble in getting the money. People pay promptly because the ROYAL lives up to your promise. It gives complete and abiding satisfaction.

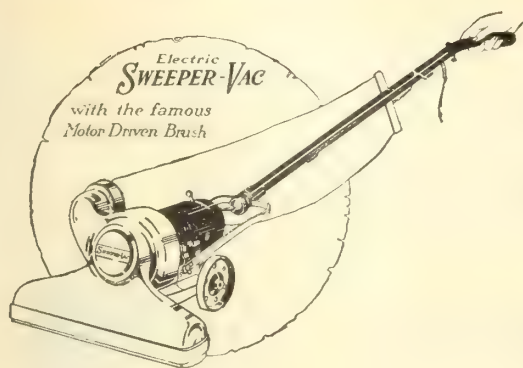
So people who buy ROYALS boost ROYALS. Each customer brings another—until you have an endless chain of unsolicited prospects coming to your store.

These satisfied customers do not stop at buying ROYAL Cleaners. They buy other merchandise—and your whole business prospers.

There is nothing mysterious about the ROYAL'S success. That success rests upon the machine's ability to do practical cleaning. Women like it because it is light, graceful and handy because it does its work thoroughly, quickly, easily, and because it does all kinds of cleaning.

You will be interested in our “Confidential Merchandising Plans”—especially if your cleaner sales have petered out during the winter slump. With the ROYAL Cleaner and the ROYAL merchandising plan, sales and Profits are sure. We have proof; write for it.

GREAT WEST ELECTRIC COMPANY, Limited
WINNIPEG - MANITOBA



SEE THE

Electric
SWEEPER-VAC
With Motor Driven Brush

We are distributors for

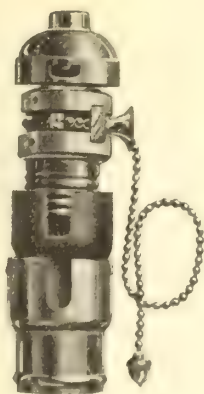
National Electric Appliances, Kribs
Washers, S. U. & W. Table Stoves, Volt
Lamps and Electric SWEEPER-VAC
Vacuum Cleaners.

An Important Feature
OF THE
Canadian National Exhibition
IS THE
EARLE ELECTRIC, LIMITED
DISPLAY OF
Electrical Household Appliances
UNDER THE
Grand Stand (West End)



70 Nelson Street, Toronto, Canada

Monarch Pull Chain Sockets



Monarch Pull chain
Socket

MONARCH Pull Chain Sockets have an extremely light action and place the least possible mechanical strain on the operating mechanism.

This feature helps to insure a long life for this device and is of marked benefit for use with fragile filament lamps.

The caps are easily attached and securely locked with a convenient snap catch.

Prices are reasonable and deliveries prompt. We shall be glad to quote you.

SELL MONARCH CANADIAN-MADE MATERIAL

Monarch Electric Company, Ltd.
St. Lambert
District of Montreal

Packard
TRANSFORMERS

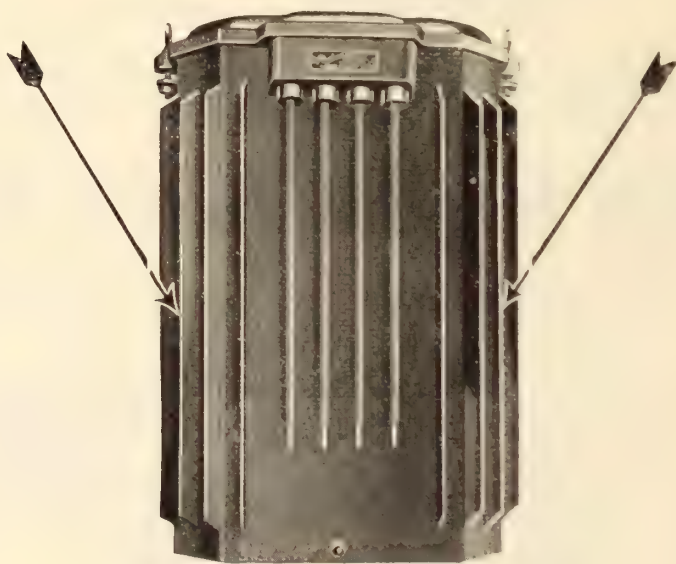
LOOK! Something New!!

Heat Dissipators

ON OUR

Welded Steel Cases

ADVANTAGES—Smaller Transformer, Less Weight,
Lower Temperature Rise, Greater Overload Capacity



Others may follow, but we lead.

The Packard Electric Co., Limited
St. Catharines, Ontario

401 Temple Building, Toronto

421 Power Building, Montreal

Confederation Life Building, Winnipeg

Agents:

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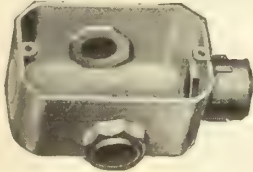
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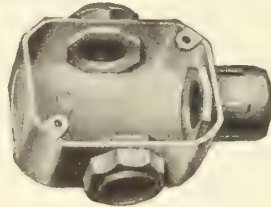
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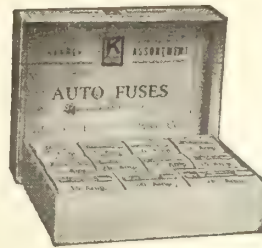


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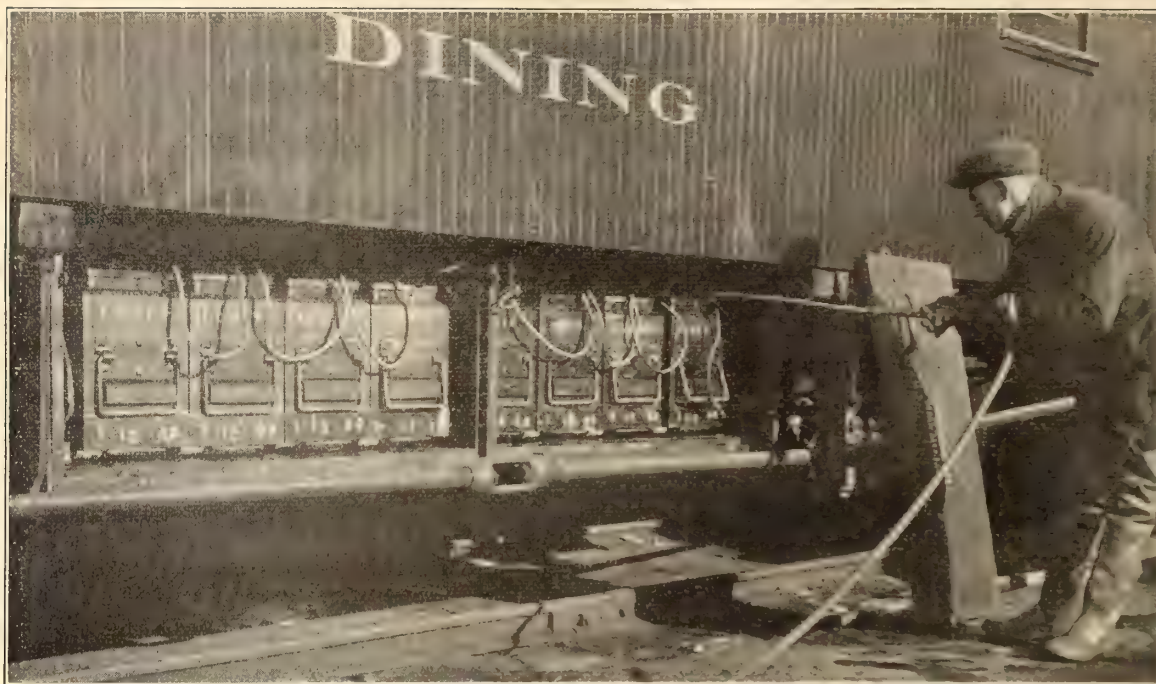
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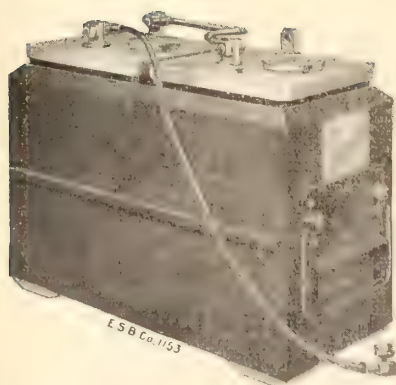
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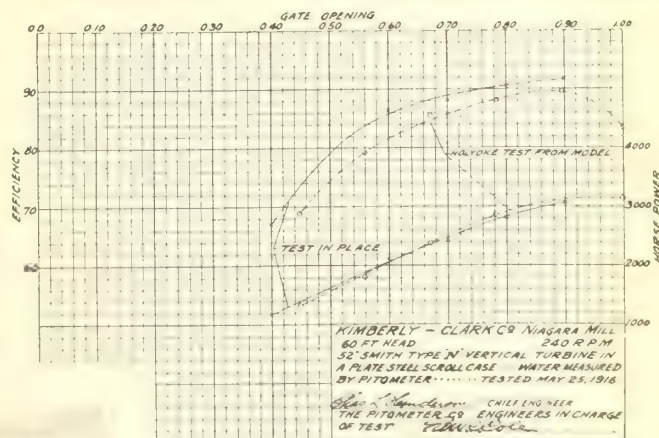
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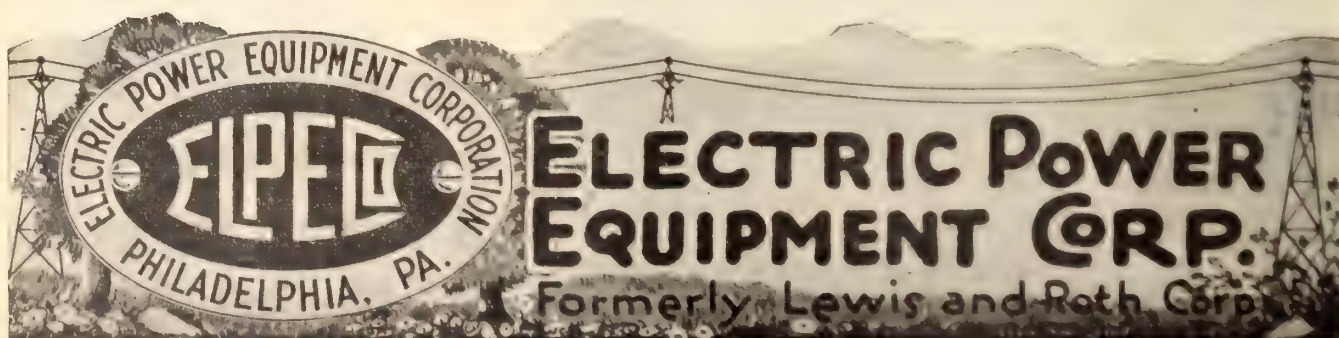
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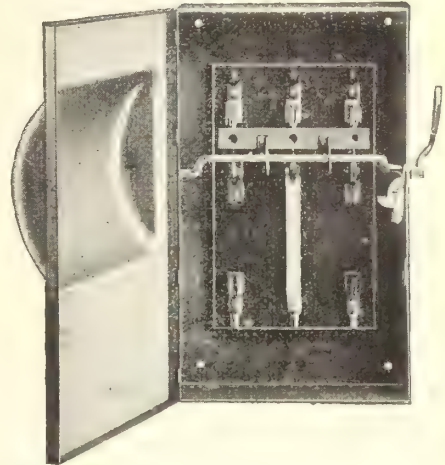
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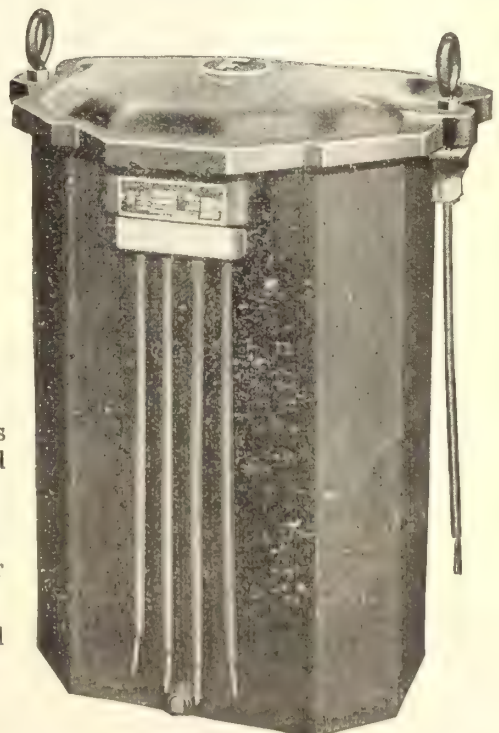
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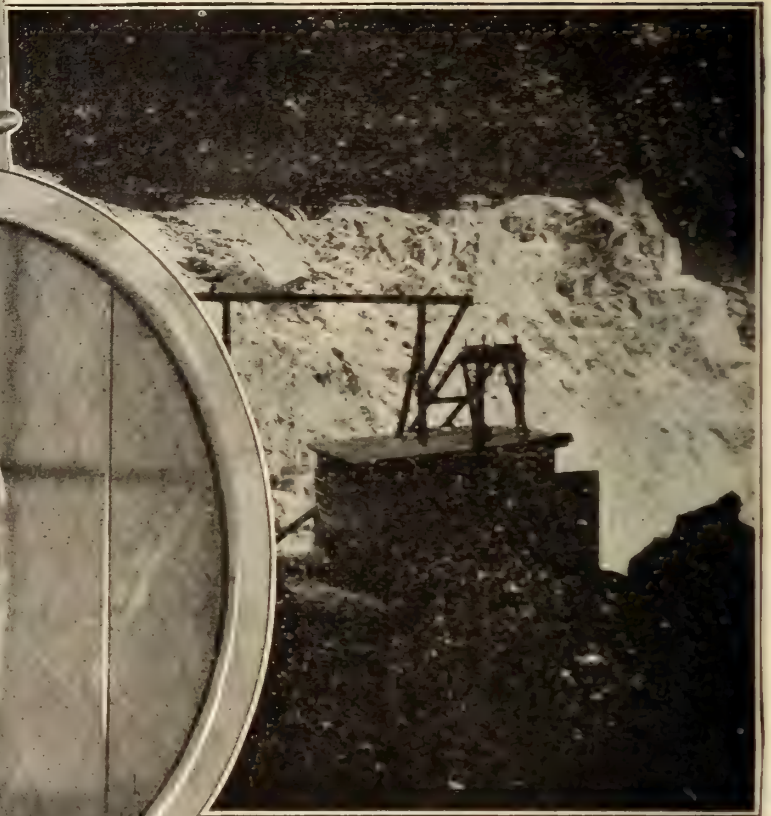
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The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.

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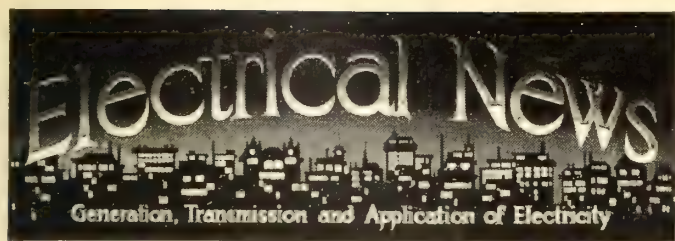
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Vol. 31

Toronto, September 1, 1921

No. 17

What They All Think about Amalgamation

Electrical News readers have shown an unusual amount of interest in the suggestion offered in our issue of July 15 regarding a possible amalgamation of the two central station associations operating in Canada, namely, the Canadian Electrical Association and the Association of Municipal Electrical Utilities; the one an aggregation of privately-owned plants, the other of municipally-owned systems.

The happy thing about the letters received is the almost entire lack of bitterness of any of the members of these associations towards our suggestion, and we take it as a good omen of the ultimate accomplishment of some such ideal as we suggested, that the men of both associations take a broad-minded, temperate view of the situation. There are many of those in the Canadian Electrical Association who express themselves as strongly as ever as being opposed to municipal ownership on principle, and there are those in the Association of Municipal Electrical Utilities who are just a little bit sore at being expelled—as they put it—from the Canadian Electrical Association. Any tendency towards resentment, however, is, plainly, not between individuals, nor between the associations, but merely between policies. In that connection it may be said that the amalgamation of which we spoke had no reference to that side of the question. It had reference to the co-operation of all the members of both organizations in such matters as merchandising; in such matters as the relationship between the central station and the manufacturer, the jobber and the contractor dealer—common problems that cannot be affected to

any extent by the policies underlying the operations of the executives.

For obvious reasons it would not be wise to print the opinions expressed in many of the letters, under the author's name, partly because most of the letters are more or less of a personal nature and express opinions which the authors knew would be respected. We print extracts, however, merely to give the general impression of the lines along which the minds of the different men are turning. After studying the whole correspondence very carefully, the writer is of the opinion that a great deal of good might result if a committee were appointed from members of both associations who would get together and see if something might not be accomplished. We cannot see why an amalgamation of the two organizations need destroy the identity of either in so far as the discussions of policy are concerned. The idea we have in mind, and we feel it must be reached in time, is one comprehensive "Executive" representing the whole electrical industry throughout the Dominion of Canada, presumably, or possibly, elected from provincial associations which in turn might be composed of as many groups as are found desirable, representing, respectively, manufacturers, jobbers, central stations, contractors, merchandisers, engineers—for the A. I. E. E. membership is a very essential part of such an organization. Neither can we see why any single group of this Dominion organization could not have its affiliation with the N. E. L. A., if such were considered an advantage. The essential thing is an organization in which the whole electrical industry in the whole of the Dominion can work together to further common aims.

We print extracts from some of the letters. One correspondent who has no direct connection with either association, and whose remarks should carry all the more weight, writes:

"There are many points in your editorial with which I heartily agree, and a few which I am afraid the very nature of your suggestions makes it difficult for myself or other members of the C. E. A. to agree with, especially at this time. On the face of it we must all see wasted effort in so many association movements, not one of which, by itself, is strong enough financially to undertake the expenditure necessary for the strongest possible organization, necessitating, therefore, a slowing up in the work it would like to undertake, and when two associations such as the C. E. A. and the A. M. E. U. are endeavoring to cover almost identical ground, wasted effort must certainly be the result, and probably neither of them is making the progress its members would wish, but we cannot overlook at this time the radically different viewpoints held by the municipal ownership and the private ownership advocates. This you have pointed out, and right here, of course, is a stumbling block in your suggestion.

"Further, you suggest a severance by the C. E. A. from the N. E. L. A. Why? Presumably to allow the amalgamation between the C. E. A. and the A. M. E. U., and for that alone, but it must be remembered that the N. E. L. A. while, of course, largely an American association, is infinitely stronger than any possible similar Canadian association, and financially able to carry on exhaustive studies, which, in most cases, are just as valuable to Canadian operating companies as though they had made the studies themselves. Why, therefore, should any argument that duplication of effort is inefficient be supported by an argument that such a severance take place, which it itself would deprive the members of the C. E. A. of the results obtained by the N. E. L. A. committee work?

"Regarding the last section of your editorial: I am with you 100 per cent.; if necessary to make the rest of your programme tie up with this let the C. E. A. and the A. M. E. U. retain their identity and become separate sections of the one big association, which should have its Dominion Executive and its Provincial Boards as well. I believe, however, that it is advisable to allow our provincial associations, and we now have them in the Maritime Provinces and in Quebec, Manitoba and British Columbia, to continue at least another year before attempting to amalgamate them into a Dominion-wide association, as there are many local problems for each of these associa-

tions to handle and which can and should be settled before a Dominion-wide association is undertaken."

A member of the Canadian Electrical Association of long standing who does not see that the question of amalgamation is practical, writes:

"It may seem to you who have not been so intimately connected with the C. E. A., perhaps, as I have that that union would be a desirable thing and practicable, but I do not agree with you. So long as the Ontario Government and the Hydro pursue their present policy regarding private companies there can be no common ground, except, possibly, in engineering matters, but the C. E. A. is not primarily an engineering body. It is intended to promote the commercial interests of the company members.

"When you go to a convention you hear a good deal that would lead you to think that the two associations could well work together, but it is at the Executive session on the last day of the convention when the only duly accredited representatives of operating companies are present that matters are discussed which could not be discussed at a general meeting."

A touch of humor is welcome at all times, and, though we feel we are quite incapable of covering up the authorship in the present case, we reproduce an old friend's reply:

"Have attended a great many conventions of both associations, and always find them pleasant and instructive—a bunch of good fellows both—I simply look

At this side	And this side
ONTARIO	QUEBEC
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Dry.	Wet.

and would say 'it can't be did.'"

Mr. M. J. McHenry, president of the Association of Municipal Electrical Utilities, is so interested in the project that he has taken the matter up with his executive. He also suggests a meeting of representatives of the two bodies. A paragraph in his letter reads:

"I have read with exceedingly great interest your excellent editorial on this question. In my own mind I feel that there should be no objection which would make the formation of such an organization impossible. There should be a method whereby both the municipal and private corporations can get together and discuss operating, engineering and safety problems with no difficulty. If this can be accomplished, the gain to both private and municipal corporations will be enormous and the interchange of ideas should have a most beneficial effect on the electrical industry at large."

Another comment runs:

"I am sorry that I cannot fall in line with your suggestion to avoid the present duplication of effort which exists by reason of the two associations, because in the first place I feel that our connection with the N. E. L. A. is too valuable to cut away from, and in the second place, I would not feel inclined to link up with the government-owned utilities.

"It is not on account of any old sentiment or lack of cordial relationship with the management with the government-owned utilities, because we have been fortunate to be so located as not to have had any friction with them, but I am convinced that the principle is unsound, and so, notwithstanding the duplication of effort in certain directions, I feel that it would be better to work out our own salvation without any closer contact with them."

A manufacturer has this to say:

"With reference to the formation of one large Central Station Association in Canada in place of the two existing associations, would state that, while I feel the one association would be highly desirable and that it eventually will come, the sentiment and prejudice existing among some of the members would prevent a consolidation at this time, particularly now that one of the associations is principally associated with the Province of Quebec and the other with the Province of Ontario. Owing to the feeling that exists in the former province in connection with municipal ownership, I question if anything could be accomplished to consolidate the two associations in the immediate future."

And here again is the obstacle that many private station men see:

"Most of us desire harmonious relations, particularly with our neighbors, but no one would like to enter into partnership with another thinking in his own heart that the other man was deliberately planning to injure his business and finally put a stop to his activities.

"From the little I have been able to discuss the matter with my friends in the Canadian Electrical Association, I feel that there is a good deal of such feeling, and I must say that the publicly expressed attitude of the high officials of the Hydro-electric Power Commission of Ontario has aggravated the disturbed feeling of the public utility men in the other provinces.

"Under these conditions it is difficult to see how any joint arrangement, except in purely technical matters, can be carried out, for one reason at least, viz., that unless the Canadian Electrical Association changes a well established policy, that policy has been against municipal or provincial ownership of public utilities."

And, finally, from a well-known Ontario private ownership operator:

"It is perfectly obvious that much benefit would result to the operating, construction, engineering, commercial and accounting branches of our industry if the two associations could combine forces and much duplication of research would be avoided. In fact, the amalgamation would enable members of each association to secure much more useful and valuable information. Nevertheless, I regard our connection with the National Electric Light Association through the Canadian Electrical Association as invaluable. The National Electric Light Association, however, as a matter of principle (and as a private ownership man of twenty-five years' standing I subscribe to it fully) is unalterably opposed to the theory and practice of the public operation and ownership of electric light and power plants. The electric light and the electric dynamo would merely be exhibits in scientific laboratories or museums and the present state of development and efficiency of electric light and power plants would not have been possible had it not been for private enterprise.

"With respect to matters of public policy and the maintenance of the integrity of private rights, I believe that your suggestion as to subdivisions of the general body is quite feasible. The factor, however, of our parent organization, the National Electric Light Association, presents a rather difficult problem, and, in my humble opinion, calls for private conference rather than publicity.

We don't think these letters—though some of them are quite outspoken—indicate obstacles that cannot be removed. We print them because we believe it is better that all electrical men should have a clear understanding of the situation, and that municipal and private operators from East and West should have a viewpoint of the general feeling existing on the other side.

Radial Report Advises Delay

Some months ago the Ontario Government appointed a Commission, composed of five members, to investigate and report upon the advisability of proceeding with the construction of radials as planned by the Hydro-electric Power Commission of Ontario. The members of the Commission were engineers, namely, A. F. McCallum, city engineer of Ottawa, and Brigadier-General C. H. Mitchell of the consulting engineering firm of P. H. & C. H. Mitchell, and Dean of the Faculty of Applied Science and Engineering of the University of Toronto. The taking of evidence occupied several months and the report has just been presented. It is signed by four of the five members and recommends the abandonment of the scheme of radials at the present time. A modified scheme involving less money is offered as a possible alternative. The fifth member of the Commission, a labor representative, presented a minority report favoring proceeding with the building of radials immediately.

Water Power Resources of the Prairie Provinces

The Possibilities for Electrical Development in Manitoba, Saskatchewan and Alberta—Development of the Resources of the West Depends on a Supply of Cheap Power

By C. H. Attwood, District Chief Engineer, Dominion Water Powers Branch, Winnipeg.

(Before the tenth general professional meeting of the E. I. C., Saskatoon, Sask.)

While the central-southern portion of the Prairie Provinces is practically without water power resources, Eastern Manitoba, Western Alberta and the northern areas of all three provinces are abundantly supplied. In Manitoba, the Winnipeg River, due to its proximity to Winnipeg, is at present the most important power river in the province. When fully regulated, this river will have a capacity of 500,000 h.p. all within roughly 70 miles of Winnipeg; of this over 100,000 h.p. is already developed and transmitted to Winnipeg and district. Other water powers amounting to nearly 2,800,000 h.p. are to be found, principally on the Nelson, Churchill and Saskatchewan Rivers.

The total power possibilities of Manitoba at known sites or drops as estimated is 3,200,000 h.p., the details of which are summarized in table No. 1.

In Saskatchewan extensive water power investigations have been made along the Saskatchewan, Churchill, Reindeer and Sturgeonweir Rivers, with particular reference to the Flin Flon mining district. These investigations have been supplemented by reconnaissance studies throughout the province.

The southern portion of the province does not possess water power resources suitable for ready engineering development

Numerous important and easily developed power sites are available on these and other rivers throughout this section of Saskatchewan and development only awaits existence of a market demand and of adequate transportation facilities.

The total possibilities of Saskatchewan at known sites and

Table No. 2.—Summary of Available Water Power in Saskatchewan.

This represents the estimated total power at sites concerning which some record is available.

River	Horse-power at 80% Efficiency.			Remarks
	Estimated Minimum Development.	Estimated Maximum Development.	Dependable with Storage	
Beaver	785	2,300		
Black	72,550	217,902		
Churchill	311,150	582,415		
Foster	906	2,728		
Geikie	2,450	7,359		
Madjatic	575	1,732		
Rapid	5,927	15,750		
Reindeer	93,070	106,560		
N. Saskatchewan	3,439	14,880		
Saskatchewan	72,240	350,750		
Sturgeonweir	5,660	9,695	(1)	(1) With storage and Churchill diversion.
Total	568,761	1,312,071		

Table No. 1.—Summary of Undeveloped Water Power in Manitoba

River	Horse Power at 80% Efficiency			Remarks
	Estimated Minimum Develop.	Estimated Maximum Develop.	Dependable with Storage	
Assiniboine	686	2,817		
Berens	11,450	18,570	13,305	
Big Black	5,140	8,339		
Bloodvein	4,100	6,660		
Burntwood	9,060	27,185	20,200	
Churchill	325,500	467,600		
Dauphin	16,960	19,540	23,450	
Fairford	2,635	3,030	3,640	
Grass	5,130	15,380		
Hayes	7,600	22,800		
Manigotagan	780	1,600	2,900	
Minnedosa	113	640		
Mossy	280	790	1,000	
Nelson	2,443,300	3,948,000		
Pigeon	24,880	40,400	28,000	
Poplar	3,885	6,285		
Red	1,060	4,400		
Saskatchewan	58,600	197,445	147,276	
Shell	30	52		
Wanipigow	400	1,100		
Waterhen	5,680	6,540	7,840	
Winnipeg	249,790	435,000	334,000	
Total	3,177,049	5,234,173		

drops is some 570,000 h.p., the details of which are summarized in table No. 2.

Alberta brings us to a coal producing province, but this has not prevented the development of approximately 33,000 h.p., principally on the Bow River, to supply Calgary. Detailed power and storage investigations have been made in Alberta on the larger rivers, while a great amount of data relating to the smaller streams have been collected. The largest resources are to be found in the northern part of the province, for of the 466,000 h.p. credited to Alberta, three-fifths is estimated as existing on the Slave, Peace and Athabaska Rivers, which offer excellent opportunities for development as soon as a market demand develops and transportation facilities become available.

As stated, the total power possibilities of Alberta at known sites or drops is estimated at 466,000 h.p., the details of which are summarized in table No. 3.

Administration

The water powers of the Prairie Provinces are administered under regulations pursuant to the Dominion Water Power Act, 1919. These regulations provide for the exploitation of the water power resources under full government control of rates, rentals, etc., in such a way as will ensure the power needs of the provinces being met to the best advantage in the public interest. The object of the regulations is to prevent unwise

or favorable economic exploitation. The central and northern portions, however, are well supplied with great water power reserves. Among the more important power rivers in this section might be listed the Churchill, Reindeer and Black.

or premature development of water power and provide for the permanent retention in the Crown of the ownership and control of the power project. Concessions are only made for limited periods of bona fide applicants capable of prosecuting the development to a successful issue.

In the administration of the water power resources, the policy of the department is in brief: to encourage desirable development of water power resources; to discourage and prevent the initiation and development of uneconomic and wasteful projects; to ensure that each site developed shall utilize or provide for the future utilization of the maximum available power; to ensure that river systems are developed along comprehensive lines wherein each unit is a component link in a system; to ensure adequate storage measures in the interests of all powers affected; to prevent unnecessary and costly duplication of expenditures on the part of competing plants; to protect the public from inadvisable power schemes and ill-designed plants and dams; to safeguard the public from monopolistic control by regulation and periodical revision of rates; to see to the early carrying into effect of agreements issued by the department for the development of power; to compel the development of existing plants to their limit when the market demands, and to the fullest conservation of the power resources of the West.

When it is realized that most of the larger streams are either interprovincial or international it becomes apparent that

Table No. 3.—Summary of Undeveloped Water Power in Alberta.

This represents the estimated total power at sites concerning which some record is available.

River	Horse power at 80% Efficiency.			Remarks
	Estimated minimum development.	Estimated maximum development.	Dependable with Storage	
Athabaska	97,795	333,550	(1)	(1)
Bow	14,852	37,319	29,085	24 hour power.
Brazeau	2,360	7,150		
Cascade	818	1,090	1,090	
Castle	1,134	4,370		
Clearwater	3,925	11,813		
Crowsnets	276	656		
Elbow	3,400	10,580	8,640	
Oldman	478	1,820	1,270	
Peace	19,000	63,500		
Red Deer	1,616	10,130		
N.Saskatchewan	4,700	25,825	10,800	(2) 24 hour power.
Spray	1,532	3,443	7,386	
Slave	313,500	599,000		
Snake Indian (Stony)	680	2,000		
Sturgeon	68	200		
Total	466,134	1,114,446		

some of the most important features of the above policy cannot be carried out by solely provincial control. Dominion administration means protection from extra provincial domination, it means relief from international interference, it assures continuity of fundamental investigatory effort by means of general water resource studies, hydrometric surveys, power and storage studies and appropriate research, all absolutely necessary for the proper understanding of the exceedingly complex issues involved in the best use for all purposes of water and power. It will assure the fairest and the most fearless administration and the establishment of a scheme of water power regulation as free as it is possible to make administration from undue political patronage or worse.

Market for Power

It is not the writer's intention to discuss at length the market for power in the three prairie provinces. Attention may, however, be drawn to the principal phases of the possible future demand. The steady influx of population to the cities, to the rural districts and throughout the northern areas of the three provinces is creating a heavy and growing demand for manufactured goods and will inevitably result in a rapidly increasing demand for cheap and dependable power. The rapidly growing market for industrial products offers possibilities to municipalities in industrial lines which municipal authorities are quick to realize. Undoubtedly the industrial activity will be centred chiefly in those cities where cheap power and good transportation facilities can be obtained.

The water powers of the Winnipeg and the Bow are already utilized in considerable measure in supplying the domestic and industrial lighting and power requirements of Win-

Table No. 4.—Summary of Developed Water Power in the Prairie Provinces.

River	Company or Owner	Location of Plant	Head in feet	Turbine or water wheel horse power installed
Bow	Calgary Power Co.	Kananaskis Falls	68	11,600
Bow	Calgary Power Co.	Horseshoe Falls	70	20,000
Bow	Calgary Water Power Co.	Calgary	10	780
Bow	Canadian Pacific Ry.	Bassano	30	135
Lake Louise Creek	Canadian Pacific Ry.	Lake Louise	115	300
Blindman	Municipality of Lacombe	Blackfalds	24	200
Winnipeg	City of Winnipeg	Point du Bois	45	67,100
Winnipeg	Winnipeg Electric Railway Co.	Pinawa Channel	40	40,000
Minnedosa	Canada Gas & Electric Corp.	Near Brandon	33	900
Minnedosa	Minnedosa Power Co.	Minnedosa	20	450
Total				141,465

nipeg and Calgary and immediately contiguous municipalities. The rapid growth of these centres offers market for constantly increasing blocks of power. The distribution of Winnipeg River power has already been extended to Portage la Prairie, Carman and Morden. Further extension in this district will doubtless take place as the market demand warrants, while the availability of power will in itself tend to more rapidly increase the market for its use. Similar opportunities for the extension of electrical distribution from central power stations offer in other parts of the West and the future power demands of the prairies can no doubt be met by a power policy which will provide for the development of all available water powers in connection with great steam plants located at or near the mines from which they draw their fuel supplies and pour the product of the hydro and steam plants into the transmission systems for distribution. On the other hand, comprehensive provincial-wide electrical transmission system designed to serve all sections, irrespective of the market demand, cannot be economically considered under the present conditions of scattered population.

The town of Own Sound, Ont. is contemplating a motor-bus service. If such a plan is carried out the buses will ply between near-by summer resorts as well as in the town.

Mr. W. T. Kdouse, 12 Hastings St., E., Vancouver, has secured the contract for electric work on ten residences being erected at 8th and 9th Aves. & Tolmie St., Point Grey, at an estimate cost of \$50,000.

Report of Electrical Apparatus Committee Canadian Electrical Association

Your committee on electrical apparatus have endeavored to keep this report in condensed form.

Attention has been directed during the past year to more adequate protection against fires originating in units, and this has taken the form of providing:

1. Better relay protection.
2. More fire fighting equipment.
3. In the case of steam generating stations, closed ventilating systems.

As stations become larger, and are operated in parallel with other large stations, it has been found advisable to provide spacing between phases, in order to minimize the danger of short circuits. The most notable instances of such practice are to be found in the Calumet station of the Commonwealth Edison Company of Chicago, and in the Hell Gate plant of the New York Edison Company. The minimum spacing of the equipment in the former station is fifteen feet between phases. While it is not always possible to make use of out-door switching equipment in cities, the desirability of wide spacing between phases emphasizes the advantages of erecting as much of the apparatus as possible out of doors. This can generally be done in the case of hydro-electric generating stations.

With respect to failures in generating apparatus, a notable case was reported in the February 25th issue of "The Electrician." In this instance the failure of the insulation in the armature winding of a new machine was finally traced to vibration of the end plates which held the laminations together by means of insulated bolts. The insulation of these bolts broke down and the resulting arc set the winding on fire. The repair and remedy were effected by using bolts which were stressed to a low value, and were therefore independent of the natural vibratory frequency of the machine.

In connection with protection of generating apparatus, it is worthy of mention that, with the increasing size of units, a few companies have decided to place electric protective equipment across the field coils of synchronous converters, to guard against the enormous voltages which may build up consequent upon short circuit conditions in the armature.

In the important matter of exciter equipment, there is evidence of greater attention being paid to the relation which the generating station bears to the transmission system and other generating stations connected thereto. A survey of recently completed water power stations shows that opinion has been in favor of motor-driven exciters in stations that operate in parallel and in such case less relative importance is attached to the water-wheel driven exciter. Motor generators, in addition to water-wheel driven exciters, are used in stations having two or more outgoing lines and where a single station supplies a transmission system.

Developments in connection with switching have been in favor of sacrificing flexibility for simplicity, and here again, as in the case of exciters, it is to be noted that the design of the station is closely associated with the rest of the system.

Your committee have to report the desirability of some standard schedule being adopted for rating large oil circuit breakers as to rupturing capacity and performance. While, for operating reasons, all large companies cannot adhere to the same practice with regard to the handling of circuit breakers, a recent canvass of leading companies disclosed that the majority were in favor of the following methods of operation:

- (1) Oil circuit breakers connected to high tension overhead

transmission systems should not be closed after they have opened automatically until tests and inspections have been made.

- (2) Circuit breakers connected to 2,300 volt distribution systems should be closed three times, at stated intervals, before leaving the circuit dead.

Thus, recent opinion calls for the rating of the high tension circuit breakers based on a duty cycle requiring the breaker to be capable of being re-closed after an appreciable interval, while in the case of low tension circuit breakers, the duty cycle requires operation four times, with intervals varying from zero to three minutes. The opinion of the principal companies is that a circuit breaker should be rated at its ultimate interrupting capacity.

A failure of a large circuit breaker which had opened once on lighting discharge, and had subsequently been damaged by a further discharge while still in the open position, points to the desirability of either interlocking large circuit breakers with their disconnecting switches, or of making it an imperative order that disconnecting switches of all apparatus in damaged condition should be immediately opened.

In connection with the provision of adequate capacity for high voltage testing, the General Electric Company have recently brought out a high voltage direct current testing outfit made up of a high voltage transformer connected to an ionic valve rectifier. The equipment, when connected to a 2,200 volt, 60 cycle circuit, will provide a d.c. potential of 100,000 volts with a current capacity of .5 amperes.

Automatic a.c. substations continue to gain in favor, and during the year it has been found that better operation was obtained from such substations during thunderstorms than from the manually operated substations.

In the past year one company in Canada has installed a bank of three 13,200 volt, 1,250 k.v.a. water-cooled transformers out of doors. The transformers rest on a concrete vault which contains the water piping, and is readily kept at a safe temperature. This company maintains that with water-cooling coils arranged for thorough self-draining and brought out vertically through the bottom of the transformer case, the matter of protection of the cooling-water system against weather hazards becomes comparatively simple.

An effort is being made to standardize service voltage, and the majority opinion of member companies appears to be in favor of voltages between 115 and 125 at the consumers' entrance switch.

Of general interest in the field of industrial equipment is the recently developed sectionalized drive for paper-making machinery. This has followed the demand for high-speed paper machines consisting of many individually driven units of different speeds, the relation of which to each other does not change, as against the single unit type of machine heretofore in use. The Canadian Westinghouse Company has recently installed such a machine in one of the plants of the Abitibi Pulp & Paper Company. Each section is driven by a direct current motor through a flexible coupling in the case of high-speed machines, but if applied to low-speed machines the connection between motor and drive is through a reduction gear, each end of which is flexibly coupled. Each one of these sectional drive motors is in addition connected by a chain drive to a slightly tapered conical pulley, which is in turn connected

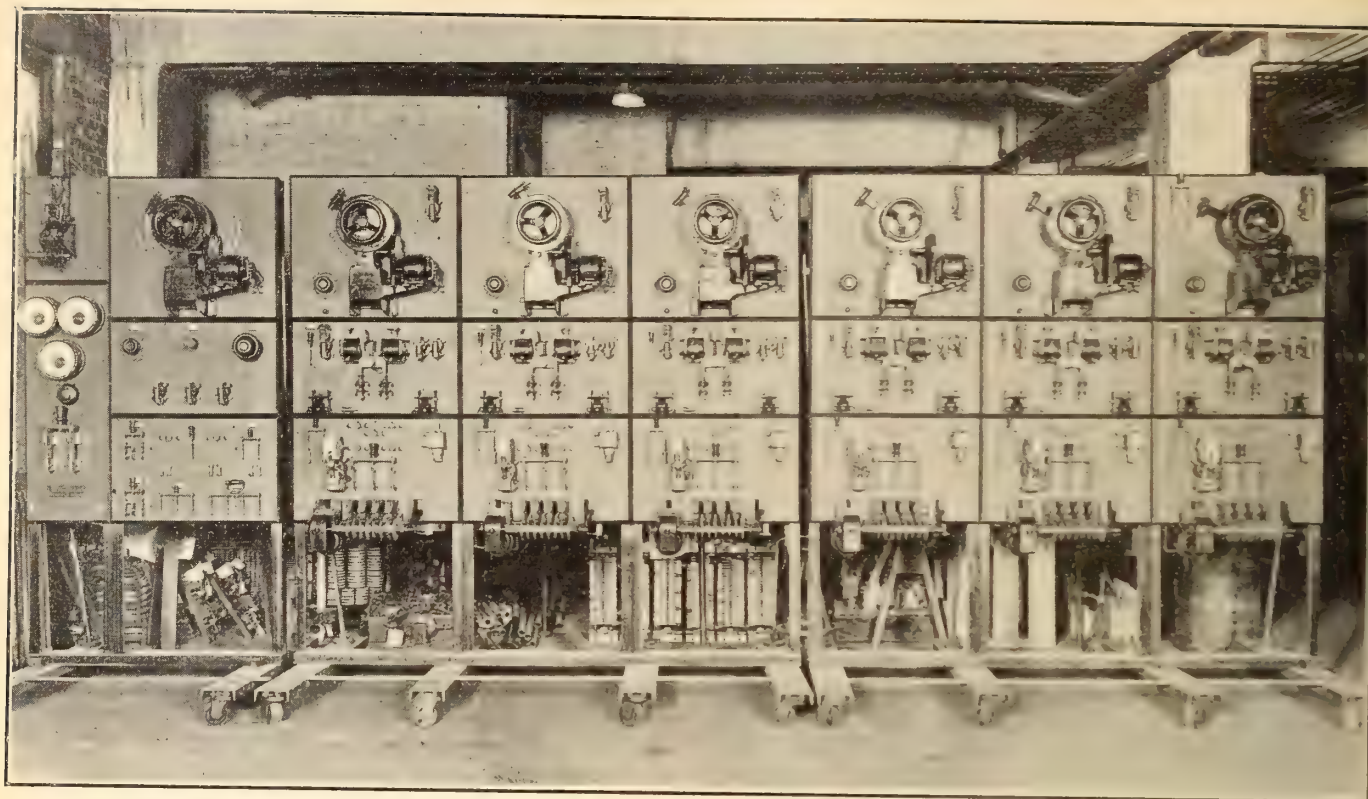


Fig. 1.

by a belt, capable of very accurate adjustment by means of a hand wheel, to a complementary conical pulley driving a small frequency generator. Each of these small sectional frequency generators has its frequency balanced against the frequency of a master or control frequency generator by a powerful rotative relay which actuates two pairs of disc contactors. As soon as there is any change of speed between sections or between any section motor frequency generator and the master frequency generator, an unbalancing of frequencies results, which is instantly transmitted to the rotary element, producing movement in one direction or the other, and thereby through the contact-making mechanism operating the section motor field rheostat, and correcting the sectional change of speed. An anti-hunting attachment prevents a tendency to over-travel. The speed of each section is constant with regard to the motor controlling set, but it is capable of individual adjustment by the hand wheel and pair of cones, so that the required amount of draw may be obtained. All of the motors are driven from a direct current, adjustable voltage generator, with a separate constant voltage exciter capable of furnishing excitation for the synchronous motor fields, the motor fields, and the various control circuits.

There is a switchboard, illustrated in Fig. 1, consisting of master control panel, and separate section motor panels, with push button control which may be in multiple with other push button stations for convenience in operation. All rheostats controlling speed are motor-driven and the entire equipment is automatic, subject only to relative section speed adjustments by hand wheel and to control as a whole, or individually, by push buttons, as before stated. We are indebted to the Canadian Westinghouse Company for the illustration herewith.

The problem of inductive interference enters the field of your committee, and is becoming more and more important as networks are becoming larger. Experiments have been made with the ordinary well-known auxiliary bank of transformers, and with transformers having tertiary windings. It appears that in order to be effective in suppressing the third harmonic, the corrective apparatus used should have a kv.a. capacity

comparable with the main bank of transformers. This can probably be most cheaply and effectively obtained by using a delta interconnected star connection of the main transformers with the delta on the station side.

Respectfully submitted: M. J. Schwegler, R. J. Everest, J. S. H. Wurtele, chairman.

Electricity Makes us Charitable

Even sweet charity has been electrified and another application of electricity discovered out in San Francisco. All of the credit is due to the noble spirit of one kind-hearted woman, a Mrs. Mary C. Thomas of that city. Mrs. Thomas is the owner of a well-known make of electric washing machine that washes the clothes and then makes them wringer-dry in one minute. With its method of operation it is never necessary to put one's hands in the water. Mrs. Thomas also owns an electric ironer. She is an enthusiastic practitioner of laundering at home, and this perhaps led her to think of the unique method of charity which she practices. Mrs. Thomas' idea is best expressed in her own letter to Jones & Cochrane, electrical distributors in San Francisco:

"After a year of perfect satisfaction with my ——— I cannot resist the temptation to tell you how it has proven not only a household help of incalculable value, but an instrument of real and practical charity. Whenever I hear of illness I try to go and offer to do the laundry for the family until things get better, for here, as you know, servants are not to be had at any price and laundries are expensive. So I feel that my ——— has helped keep things comfortable in many poor homes and tided many a weary mother over trying days."

Mrs. Thomas drives a large roadster with which to collect the washing of poor families, takes it home and launders it, then returns it without charge to the owner.

Ornamental Lighting along Sunnyside Boulevard, Toronto West

Considerable attention has been directed recently toward the Sunnyside section of the Humber Boulevard, work on which is sufficiently far advanced to give the general public a fair impression of the complete boulevard development as planned by the Toronto Harbor Commission.

Arrangements have been completed between the Harbor Commission and the Toronto Hydro-electric System for the boulevard lighting, and the Toronto Hydro engineers have recently placed orders for the lighting standards and other equipment.

Local conditions influenced the Harbor Commission to select a lantern type of lighting fixture, as shown in Fig. 1. This unit will be made of cast bronze with Colonial opalized stippled glass panels on the sides and top. The fixture will house an 8½-inch Holophane dome refractor with a porcelain enameled top reflector constituting the refractor holder. The combination of reflector and refractor is designed to direct the maximum light on to the street surface at an angle of approximately ten degrees below the horizontal, at the same time per-



Fig. 1: Lighting Standards to be installed on the Humber Boulevard. They will be mounted 100 feet apart and carry 1000 c. p. 20 ampere, series lamps. Each standard will be equipped with its own transformer housed in the base.

mitting enough light to escape upward to properly illuminate the glass panels in the top of the lantern. Pressed steel poles of very pleasing design, furnished by R. E. T. Pringle, Ltd., give a mounting height of approximately fifteen feet at the light centre. With this mounting and with the particular quality of stippled diffusing glassware used, there will be a complete absence of glare.

The units will be mounted at approximately one hundred-foot intervals, arranged opposite to each other. Initially 600 c.p. lamps will be used, but ultimately it is proposed to use a 1,000 c.p. lamp in each fixture. The lamps will be 20 ampere series, designed for tip-up lighting. Each lamp will be supplied by a 1,000 c.p. 6.6/20 ampere I.L. series transformer, buried at

the base of the pole. The series system will be fed by a number of automatic constant current transformers of the outdoor type. Provision is made for reducing the candle power of the lights after midnight in order to materially increase the lamp life.

All of the equipment except the standards and the underground cable will be supplied by the Canadian General Electric Company, the bronze lantern being manufactured locally at their Architectural Bronze and Iron Works.

Pays Large Dividends

By Reginald Trautschold, M.E.*

On the shortest day of the year, December 21st, the number of fatal accidents in industrial establishments is some 40 to 50 per cent. higher than on the longest day, June 21st.

In the iron and steel industry during 1905-1910, the accidents occurring at night were nearly 20 per cent. more numerous than those occurring in the day time; while in the yards, where illumination is naturally less adequate, the excess of accidents at night jumps to nearly 130 per cent.—and this despite the natural tendency to be more cautious after nightfall.

For each fatal accident there are over one hundred thousand sufficiently serious to incapacitate the victim for an average period of a year, and some one hundred and twenty-five thousand each year in the United States alone which are avoidable—all due very largely to poor industrial illumination.

In view of these startling figures plain humanity demands adequate and proper industrial illumination. Economic consideration—hard headed business—endorses the need by equally startling statistics. Almost thirty million dollars are now wasted—thrown away—in the industrial plants in the form of spoiled material and inferior workmanship, due to poor lighting, as from 25 to 40 per cent. of all factory work is carried on under artificial light and less than 10 per cent. of the factories and mills in the country are properly or adequately lighted.

Other Ills in Illumination

Bad lighting, however, is not always due to lack of illumination.

Bare lamps in the line of vision cause glare and harsh shadows, resulting in eye strain and wasted light. Miscellaneous local drop lights are also apt to cause glare and eye strain and to be productive of accidents, particularly about moving machinery and belting.

Clear lamps, where polished surfaces are present, are apt to cause reflected glare and are another source of eye strain.

Sharp shadows, which are due to insufficient diffusion of light, cause many accidents, much loss of time and eye strain.

If the general lighting units are too far apart or of too low intensity, "spotty" lighting results between the lamps and the insufficient lighting between lamps is very apt to cause dense shadows.

The gloomy and cheerless appearance of an improperly or inadequately lighted room may cause unpleasant contrast between light sources and backgrounds, having a depressing effect upon the spirits of the workers.

Dusty, dirty or broken lamps and reflectors frequently cause the loss of from 40 to 60 per cent. of the light generated and paid for.

Finally, too little illumination, obviously results in time lost by workmen, and affords them no inducement to keep their surroundings clean and tidy. **Only two minutes per day wasted by each worker would result in a monetary loss that would more than pay for the entire cost of maintenance and operation of an adequate and proper lighting system.**

*Of the staff of the Society for Electrical Development, Inc.

A Valuable New Reference Book

"EMF ELECTRICAL YEAR BOOK." First annual edition, 1921. Chicago: Electrical Trade Publishing Co., Chicago, Ill. Cloth, about 1000pp. (9 by 12 ins.). Price \$10.

The first edition of what its publishers aim to make a very useful and annual reference book of current information for and of the electrical industry has made its appearance. It comprises three leading features: Compilations of facts and figures about each branch of the industry, definitions of electrical and allied terms, and a classification of products made and used by the industry with listings of their producers. This last feature is the most prominent one of the book as regards number of topics and listings. All topics are entered alphabetically, the entire text being arranged as in an encyclopedia or dictionary so that it is very easy to find any item desired.

In the products and manufacturers' directory feature there are included over 2900 classifications and subclassifications of electrical and related products, each of which is first descriptively defined and followed by the list of its American and Canadian Manufacturers. Each leading class of apparatus (such as generators, motors, batteries, switches) is preceded by a general article on principles, types, production, etc. The products include not only all distinctively electrical machinery, instruments, appliances and supplies, but all other equipment needed for power plants, lines, electric railway tracks and cars, electrical manufacturing, contracting or merchandising, in short everything, except service, that is produced by or bought by any branch of the electrical industry. This constitutes nearly six times as complete a buyers' electrical guide as any heretofore prepared.

Supplementing this feature are separate alphabetical company listings of over 4900 manufacturers, so that main and branch offices, executive offices and other information about them can be quickly ascertained. A further type of entries in the products class consists of about 4350 trade names which enable one to find readily the name of the manufacturer using each.

The dictionary feature includes, besides the definitions of the products referred to, definitions of several thousand electrical words, terms and abbreviations, also of magnetic, photometric, chemical and other terms closely related to the electrical. These definitions cover words of theoretical or scientific nature as well as those of practical and trade interest. They are written in as simple style as is consistent with technical accuracy.

The new line of electric furnaces which has recently been added to the products of the Westinghouse Electric & Mfg. Company is described and illustrated in catalog 9-C, which is being distributed. This type of furnace includes the multiple unit designed for use with heats of 1800 to 2000° F. The small Hevi-duty furnaces of the multiple crucible type may be operated continuously at 2000° F. Hevi-duty industrial furnaces with applications for annealing, hardening, drawing and enameling are described in minute detail in this publication. A discussion of the characteristics of these furnaces is also given.

Messrs. Yapp & Corbyn, 732 Pelessier Street, Windsor, Ont., have lately started in the electrical contracting business.

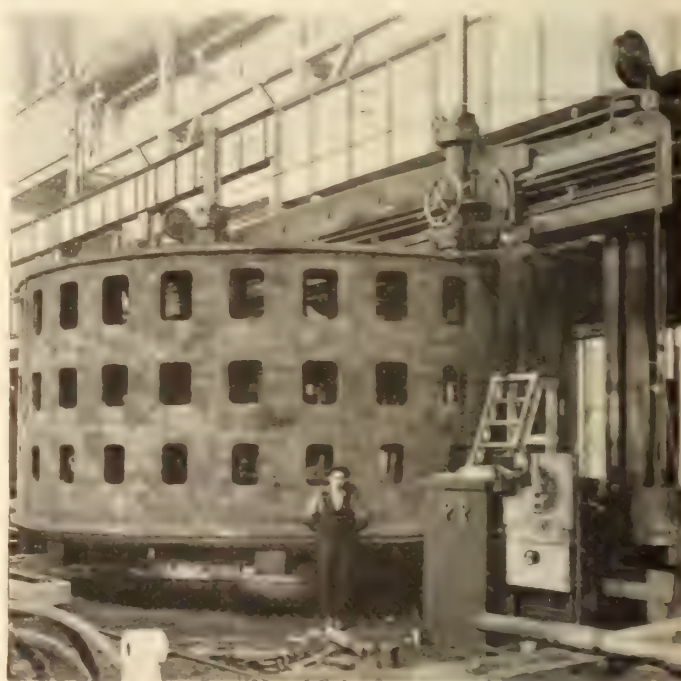
The Toronto Electric Co., 101 Duke St., have been awarded the contract for electric work on an addition to be built to the Gledhill Avenue school at an estimate cost of \$105,000.

Gigantic Generator Frame for Chippawa cast in Allis-Chalmers Foundry

Another proof of the fact that Canadian enterprise can successfully cope with any demand made upon it is furnished by the job recently carried out in the Allis-Chalmers foundry in Toronto.

This job comprised the casting of frame parts for the new Chippawa generators, and is remarkable because of the amount of metal that was used and the successful manner in which the whole affair was carried through. The generators for which the castings were made are to deliver energy at 12,000 volts and have the tremendous capacity of 45,000 kv. a. They are of the vertical type, and are designed to run at 187.5 r.p.m. Naturally they are of great size and the casting of the frame parts presented a novel problem.

The base was the heaviest piece, and was estimated to run about 45 tons; the thickening up of certain portions, which were considered too light in the original plan, increased the weight to over 47 tons, which makes it one of the heaviest castings that has ever been poured in Canada. An idea of its size may be



gained from the fact that it is about 82 ft. in circumference. The mold was built into the floor of the foundry, and was about deep enough for a man to stand on the bottom and have his head level with the top. A grab bucket was used to handle the large amounts of material that were required. The casting was poured from a 20 ton and a 35 ton ladle, the runner and risers taking up the extra metal; the mold was filled in two minutes and forty seconds after the signal was given to begin pouring. The casting turned out to be first class and was lifted from the mold with very little damage thereto; in fact, a similar casting will probably be poured in the same mold.

The generator shaft, which is also under construction in the Allis-Chalmers factory, is an interesting piece of work. It is hollow and runs about 24 in. in diameter, and a layman might easily mistake it for the business part of a piece of heavy artillery.

Messrs. Reid Newfoundland Company, St. John's Newfoundland, have been awarded the contract for wiring a bank building being erected at St. John's by the Royal Bank of Canada at a cost of \$250,000.



The Complaint Department of an Electric Railway System

By W. H. DARRACOTT, Winnipeg Electric Railway Company.

The Complaint Department of any transportation system is the contact point between the public and the company, and in seeking to make this department function in the most efficient manner, the Winnipeg Electric Railway Company has endeavored to treat complaints of the public from a sympathetic and human standpoint, rather than from an analytic point of view. It is true that the company analyses and classifies the complaints received, but it also endeavors to find the causes of public displeasure, some of which no doubt are due to our own fault, but many of which are unavoidable.

In the conduct of the Complaint Department there are three relationships involved: (1) company and passenger; (2) company and employee; (3) employee and passenger. The first class embraces complaints against rules and orders of the company. In this case the employee is merely the agent of the company, passing on its rules and orders to the passengers. It is very difficult sometimes for the passenger to see any reason for the many rules which we are compelled to make. The operation of a street railway is peculiarly subject to all sorts of restrictions, and we are often able, by explaining the reason for a rule having been made, to satisfy the complainant as to its reasonableness.

Take the case of transfer points. A number of complaints are received where conductors have refused to accept transfers at other than transfer points. In these cases the complaint is not against the conductor, but against the company which makes the rule, and in ninety-nine cases out of every one hundred, it is only the work of a few minutes to explain to a passenger that this rule was made for two especial reasons: (1) To prevent the abuse of the transfer privilege which, unfortunately, has become very common; and (2) to enable us to speed up our service by assembling transfer passengers at one point, thereby eliminating the number of intermediate stops which otherwise would have to be made for the sole purpose of picking up transfer passengers.

The matter of car stops is a continual source of abuse. An individual moves to a certain street and immediately thinks that car stops should be placed there. We have only to point out that the street car is run for the convenience of the general public, that it has not the exclusiveness of a private carriage, and as a public conveyance, it is required of each passenger that he should sacrifice some of his individual convenience to the general good. It is this fact which creates the rules necessary for public convenience.

In the case of suburban service I have found that the passenger is not so much concerned with the frequency of the car service as he is with its reliability. We have one line where an hourly service is in operation and it is largely by the establishment of timing points at several places along this line, and

the strict adherence to schedules on the part of the motorman that we have been successful in obviating the reception of petitions from this community to increase the service.

Our relations with the train men are primarily of an instructional nature, and it is only when we find an employee incapable of receiving instruction that disciplinary measures are resorted to. At the beginning of the winter we make a special appeal to each man to make every possible effort to see that intending passengers are not passed up at the season of the year when street car traffic is at its maximum. We point out to our men that the riding public is really their employer, and without its support, their positions would be insecure. We, therefore, point out that all the efforts and expense which the company might make in endeavoring to create a responsive and co-operative feeling amongst the public cannot be productive of maximum results unless they back up such efforts with efficient, courteous service. The golden rule applied to street car work is, we believe, a great factor in the elimination of complaints. Rather than picking flaws and arguing with passengers, we teach our men to keep quiet, and that discourtesy towards a passenger is not in the best interests of the company, and, therefore, not in the best interests of the employee.

Complaints against train men appear to fall under three distinct headings: (1) insolence; (2) rigid application of rules; (3) neglect of apparent duty. It is really surprising how all-embracing the word "insolence" is. If a conductor refuses a transfer dated a week back, he is often dubbed insolent. If he refuses to allow a passenger to bring the family wash on to the car, he is **very** insolent, and if he requests a passenger to move up to the front of the car, he is often accused of being most insolent. Where cases of insolence are found to be justified, we deal with the employee very severely. Oftentimes complaints are received regarding the too rigid application of rules; and these are the most difficult to handle. Where the employee is to blame, we admit it. Where the passenger is to blame, we show him why. But where the conductor has failed to use discretion, while abiding strictly by the rules, we are often placed in an embarrassing situation. We cannot always censure our employee, as our rules are set forth in the rule book and on the bulletin board, nor can we in some cases tell the passenger that he was wrong. In such cases we explain to the passenger that our policy is to see how few rules we can make; and make these rules very general to cover any situation that may arise anywhere on the system, and that while the conductor would not have been censured for relaxing somewhat on that particular occasion, yet his rules were very clearly stated, and that making exceptions in different parts of the city to different people would create endless confusion, and that he (the passenger) can help us to maintain an efficient service by submitting to our regulations, with the assurance that every rule that is made is as fair and reasonable to the passenger as

it is to the company. Cases where the train men have failed to perform their duty, i.e., passing up passengers, starting car too quickly after a passenger has boarded or alighted, etc., are, of course, ample reasons for dealing with them in a disciplinary way.

It has been repeated so often as to become a proverb that the passenger is always right. The writer thinks that the passenger does not want such a maxim applied to him unless he is unquestionably right; that three minutes' sincere talk and explanation in a diplomatic way will do more to establish good relationship between the company and the travelling public than half an hour of insincere bluff. The passenger is not always right—in his heart he knows it—and the sooner he can be shown where he is wrong the sooner we shall be rid of petty unjustified complaints.

The application of these ideas since Mr. A. W. McLimont took charge of this property has resulted in a marked diminution of complaints received, and has been productive of growing public interest in the Winnipeg Electric Railway Company and its management.

In conclusion, the following is a good incident of quick thinking on the part of one of our conductors. It happened during the time when red tickets, valued at 5 cents, were good during rush hours and all day Sundays. A passenger boarded one of our cars at 15 minutes after midnight one Saturday night. He placed a red ticket in the fare box. The conductor pointed out to him that he could not accept that ticket as a fare. The passenger remarked that it was Sunday morning and that red tickets were certainly good all day Sunday. The conductor smilingly allowed the passenger to proceed on his way into the car, and on being asked for a transfer the conductor merely grinned and said: "Sorry sir, I have not received my Sunday supply of transfers yet."

Winnipeg Tramway Rates are Settled by Amicable Agreement

Negotiations between the Winnipeg Electric Railway Company and the City Council of Winnipeg, which have been in progress for some months past, have consummated in the passing by the city council of an agreement with the railway company which puts an end to the fare controversy and all litigation connected therewith, stabilizes relations between the company and the civic authorities and augurs well for harmony and continued cooperation between the company and the city in the future.

As reported in a former issue, the Public Utilities Commission of Manitoba granted the street railway company, on three different occasions, higher fares. Exception was taken by the city council to the final order, which was made August 20th, 1920, giving the company a 7-cent cash fare, 4 tickets for 25 cents, seven children's tickets for 25 cents and abolishing cheap workmen's fares. Holding that the Public Utilities Commission had no jurisdiction to alter fares which were stipulated in the original franchise, the city council went to the Appeal Court of Manitoba to have the order set aside. A unanimous decision of the Appeal Court, given April 4th last, upheld the Commission's order, ruling that the Commission had such jurisdiction; whereupon the city council decided to carry its case to the Privy Council in London, England. In the meantime, however, negotiations were opened with the company, the council appointing a special sub-committee to try and effect a settlement of all transportation problems, dealing first with matters regarding which litigation was pending.

A. W. McLimont, vice-president and general manager of the Winnipeg Electric Railway Company, together with Edward Anderson, K.C., counsel for the company, met the sub-

committee in a number of round table conferences, which resulted in a frank interchange of opinions and the finding of a common ground on which the company and the city could get together.

An agreement was then drawn between the company and the sub-committee, which agreement was ratified by the city council and came into effect August 1st. This agreement restores the by-law which incorporated the franchise as being "in full force and effect, except as to fares," and places the by-law and all agreements and dealings between the city and the company beyond the jurisdiction of the Public Utilities Commission. Under this agreement the council agrees to a revised rate of fares (now in effect) and provision is made for an early revision of fares by arbitration, if necessary: the arbitrators—one appointed by the city, one by the company, and the Chief Justice of the Province or his nominee—to decide a just and reasonable fare, having regard among other things to the value of the property of the company devoted to transportation purposes.

The revised rates of fares which came into effect August 1st maintains the seven-cent cash fare, with four tickets for twenty-five cents; provides for a five-cent cash fare on Sundays, nine tickets for fifty cents on week days during the hours 6 to 8 a.m. and 5 to 6.30 p.m., while school children's tickets are eight for twenty-five cents, as against seven for twenty-five cents which previously obtained.

Negotiations between the company and the city will be continued with a view to settling all matters regarding which the city and company are at present at variance.

They all appreciate the "Exide"

The Electric Storage Battery Co. are frequently in receipt of unsolicited testimonials regarding the popularity of their batteries, but the following letter is of such an unusual nature and so full of every-day interest that we pass it on to our readers for their information—and amusement:

Canadian Methodist Mission
Chungking, West China

The Electric Storage Battery Co.:

Dear Sirs:—For the information of your mailing department, may I be permitted to mention a few facts.

Chungking is situated on the Yangtse River, 1000 miles from the coast. The only means of communication with the coast is by the Yangtse River. The only means of communication with the interior of the province of Szechwan is by roads which average three feet wide. The nearest thing to a motor car in this province or any adjoining province is a Sedan four (man-chair). In this city of Chungking which is easily the most progressive in this or any neighboring province, the streets average ten feet wide and one can't go many hundred yards without having to climb steps.

Under the circumstances the amount of sales of Exide batteries hardly warrant the postage on the numerous communications you have been sending me, even if I were an auto supply agency instead of a mission business agency, and even if I were entitled to the degrees of "B.A." and "B.S.C." with which you have so kindly endowed me. With humility I have to confess I am entitled to neither. But I am interested to know how I got on your mailing list, and in view of the postage and paper (and it comes high these days) which this letter will save you, you might at least satisfy my curiosity on this point.

Allow me also to state that I am quite convinced that the Exide is an excellent battery and that it is backed by an alert and efficient organization.

GORDON R. JONES

The Contractor-Dealer

Advantages of Complete Electric Installations in Houses

An Address delivered to the Members of the Manitoba Electrical Association

By Fred. T. Shipman*

As we approach the subject of the contractor-dealers' part in a boost for the "Home Electrical," we realize it is not a new one, and to those who may have made a study and are conscientiously doing their part, my remarks may seem commonplace. We hope, however, that in reviewing the matter some worth-while feature may appeal sufficiently to engage your interest. At times these matters which are considered commonplace may, by the application of thought and action, be lifted out of the rut and made worth while.

Should the farmer in thickly populated countries like England fail to apply the best methods in cultivating the small piece of land at his disposal, thereby increasing production, his income would be so small he could not exist to-day.

As time progresses the same reasoning will apply to our industry. Therefore, it may be well to pause by the wayside, look over the situation and see if there is room for improvement.

Home Electrical Equipment

Most of us recognize the advantage of electrical equipment in the home, but frequently we overlook opportunities to increase our business and contribute as far as possible to building up the industry.

Occasionally our anxiety to get the order leads to "pruning" or an endeavor to see how much of a given installation can be omitted in order to "keep the price down" rather than trying to see how much can be added to a reasonable degree, thereby increasing our own business and helping the industry.

Frequently in our haste to get off one job and onto another we forget about the proverbial "bird in the hand is worth two in the bush." We should undoubtedly make the most of the job in hand before jumping to the one in view. Incessant jumping increases overhead and therefore eats into profits, when there are any.

Show me a better prospect than the customer who proudly boasts that his home is wired for a range, appliances or convenience outlets. Many of these appliances are necessities to-day.

The cheap rates available for current, for which we are duly thankful to our power companies, offer an invincible argument in favor of the complete wiring of every home.

The contractor who fails to remind the customer of these rates deserves only what he gets in business.

Minor Building Costs

Electric wiring is one of the least of building costs and contractors should discourage every attempt by any one to cheapen, or eliminate, any part of an installation.

The customer who finds after a while that his house is half wired and things have to be torn to pieces, or at least so he

imagines, is not so very enthusiastic about adopting the "cook by wire" method.

Every contractor owes it to himself, his customer and the industry to see that every installation is as complete and convenient as possible. This is not only a duty, but a profitable one.

Often a suggestion or recommendation from the contractor will accomplish much. Most people realize that the contractor is an authority and qualified to handle this detail of building.

We should never lose sight of the fact that each home is a prospect for equipment from \$800 up, in addition to the wiring. The \$800 represents a modest equipment and can be easily increased by three or four hundred dollars under present conditions. As the present rate of development it is not difficult to forecast that the above amount can be largely augmented.

An Extensive Field

Remember, that while the simple outlet seems a small item and perhaps looks like two dollars' worth of business and probably twenty cents profit, some day a \$75 vacuum cleaner or \$200 washer will be bought and attached to the humble outlet. You, Mr. Contractor, by remembering the little outlet, will have a good argument with which to approach your prospect. If you don't sell him someone else will, and you in turn will no doubt reciprocate by connecting your goods to another fellow's outlets.

As time progresses the owner of the home begins to look for means to improve the place—why not assist him to attain convenience and to enhance the beauty of the home? Don't let the furniture man and the decorator do it all. Judicious expenditure on many useful appliances, beautiful lighting fixtures and convenient portable lamps is a field he should not be permitted to overlook.

We should endeavor to see that he does not have to tear the floors up and the walls down to provide outlets sufficient for connection of his many requirements.

A complete and convenient wiring installation is remembered long after the price is forgotten.

How Shall We Do It?

We must help the customer to realize the advantage and value of complete and convenient installations. This can be accomplished in many ways, some of which are as follows:

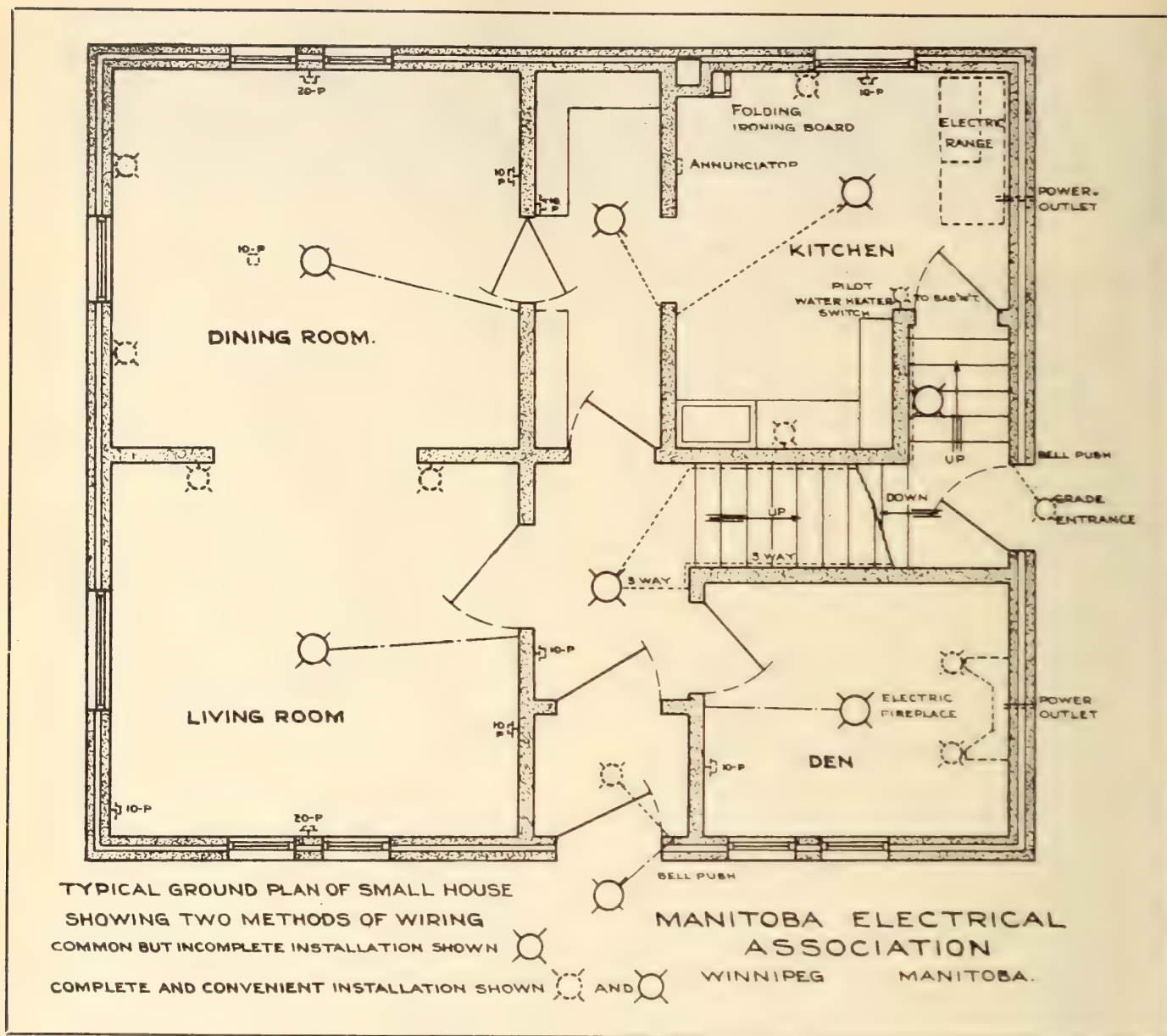
Through giving the subject constant thought and attention.

Through the public press and our own advertising. In our window displays and store arrangement.

By advising the architects, builders and owners at every opportunity. By demonstration at our electrical exhibitions.

We have all probably observed the methods used in selling talking machines. They appear to be worthy of study and emulation and could probably be employed profitably in our own field. Note the intensive cultivation that has been going on for years in that business. Every home is considered a prospect, and apparently they will never pause until every home is a purchaser. It is interesting to note that now they are advocating a change of style which would open up the whole territory again. This is surely a shining and outstanding example of the selling art.

In our observation people hesitate more to spend \$75 for a



vacuum cleaner, a necessity, than they do to spend two or three hundred for a Victrola.

Co-operation Urged

To endeavor to change this sentiment seems to be worthy of a trial. It would not be a small undertaking and would require the unremitting and united efforts of the most capable men in our industry.

Many of our manufacturers deserve credit for developing the washing machine business, vacuum cleaners and some other lines. We should help them in their efforts, as any movement to improve the industry is bound to help us.

"The servant is worthy of his hire." Let us in the electrical industry unite in rendering the best possible service to humanity. When we are satisfied that we are doing our work faithfully and efficiently we can surely hope and strive for more and fair remuneration.

To the contractor-dealer I should like to leave this final thought: Every outlet means future business. That we should all work for the future as well as the present and reap the harvest when "outlets are converted to incomes" may well be the goal of every electrical contractor-dealer.

The fare on the Windsor street railways has been increased to five cents straight instead of six tickets for a quarter.

Personal

Mr. E. V. Caton, electrical engineer, Winnipeg Municipal Electric System, recently spent a few weeks in the Province of Ontario, visiting Toronto, Peterborough, Hamilton, Niagara Falls and other points.

Mr. J. C. Reston, Vancouver, B.C., attended the recent convention of the National Association of Electrical Contractors and Dealers held in Buffalo.

A new Catalog

The Steel City Electric Company are making a new edition of their Catalogue No. 33. The foreground shows a new 3-storey addition to their factory. It is well illustrated. Attention is drawn to the fact that certain changes have been made in the design of their equipment in accordance with the recommendation of the Standardization Committee of the Associated Manufacturers of Electrical Supplies.

A wireless station, including a workshop, will be erected at High River, Alta., by the Dominion Government at an estimate expenditure of \$10,000. Mr. Percy Taylor of High River is the general contractor.

The Conduct of an Electrical Contractor-Dealer Business

By M. H. JOHNSON, before the recent Buffalo Convention

This topic has so many phases that no attempt will be made here to outline or repeat the numerous principles and practices which have been set forth and accepted as basic for the proper conduct of this business. The indefiniteness of the name "contractor" is in part the reason for the manner in which the subject is handled.

The need of certain definitions and terms in our work is very obvious. Much misunderstanding and loss of time results from the vague meaning of many of the expressions used, and our progress is somewhat hindered by the lack of proper words with which to express the thoughts intended.

Our business is perhaps more technical and scientific in its public conduct than most others. We should therefore have a concise vocabulary to permit of clear and forceful statements. It is hoped that the association will act officially to sanction such terms as are acceptable and arrange for continuous adjustment of our vocabulary as needs occur. New words and meanings are being added to our language in a purely haphazard way. For our own purpose some more intelligent method should be used.

Perhaps our keenest need is a word meaning "Electrical Contractor-Dealer," so an attempt has been made to find it. Electric, being of Greek origin, the idea at once occurs of combining it with the Greek root of our verb to lead or act. An inquiry on this line was sent to many libraries, universities and similar sources of knowledge. Dr. Robert M. Yerkes, chairman of Research Information Service of the National Research Council, took the matter up. The result is a very scholarly and erudite opinion by Prof. Henry S. Washington of the Geophysical Laboratory, Carnegie Institute, Washington, D.C. The suggestion is to use the Greek AG meaning to "lead" developed in this manner (pronounced like Metallurgy):

Electrâgy—Name of the trade or business of Electrical Contractor-Dealer.

Electrâgist—A person conducting such a business.

Electrâgician—A person working at the business.

Electrâgize—A verb—to work at the business—or to provide electrical equipment.

Electrâgic—An adjective—relating to the business.

Electrâgian.

Electrâgial.

These words have been submitted to a number of prominent men for approval. They are convenient, euphonious and correct from a scientific standpoint. It is suggested that the association adopt them unless something more suitable is presented.

In considering the problems of our business and reviewing what has been done toward their solution it is apparent that much more could be accomplished by setting up certain standards as to records and accounting. This makes comparisons easy and tends to better understanding of the question needing study. The work of the association in standardizing book-keeping methods has been most useful in this respect.

The following suggestions are put forward more with a view to having standards adopted rather than that these particular definitions and groupings are the best to be obtained. The main questions considered here are the most convenient divisions under which to treat the functions of a business—the kinds of business handled, and the expense items.

The purpose of a business being to earn money, its necessary functions can readily be put in three divisions.

1. **Selling**—by which is meant every effort to procure orders or sales of the wares handled.

2. **Executing**—these orders, including procuring the goods and placing them as required by the buyer.

3. **Financing and accounting**—covering the necessary fiscal activities and records of the business.

Grouping all activities under these heads requires a careful analysis which helps to check unnecessary activities that sometimes can be done away with.

Many items of cost can be charged directly to individual jobs, like direct labor, materials and their transportation. These charges do not properly belong on expense accounts, but provision must be made for them when estimating for bids or charging for labor and material furnished. They must be used in determining the costs of completed jobs. Such items have mostly to do with the executing cost.

These three divisions of activity are especially useful in handling expense items. Much advantage results from knowing the proportion of expense incurred for selling, executing and accounting separately. This advantage is greater when a further subdivision of expenses can be made showing how much attaches to the various kinds of business done.

To make this possible, the business must be divided into groups or departments. It is apparent this cannot be done according to the kind of material handled. For instance, selling a lamp socket over the counter is a retail sale; selling a box of them to a mill is wholesale business, and when sockets are furnished on a wiring installation, it is construction work. Our business is capable, however, of four general groups and numerous subdivisions according to general character.

Construction—All business in which material is installed and labor therefor furnished.

Lamps—All incandescent lamp sales.

Supplies—Miscellaneous material sold without labor.

Automobiles—Vehicles, batteries, including their repairs, and accessories.

Further subdivisions are advisable for a large general business. Those concerns which specialize closely in some cases need other groupings.

Sales Groups.

Construction:

- 1—Interior wiring, conduit work, including all fittings installed therewith.
- 2—Fixtures, including all electric lighting appliances and installation of same.
- 3—Lighting plants, including all prime movers, generators and their installation.
- 4—Outside construction, pole line, underground and railway work.
- 5—Motors, controllers and commercial motor appliances and repair work.

Lamps:

- 6—Standard incandescent lamps.
- 7—Auto and miniature lamps.

Supplies:

- 8—Motor driven domestic appliances, including washers, cleaners, icers, etc.
- 9—Retail store sales, including heaters, cookers, wireless apparatus, battery lights, etc., not otherwise classified.
- 10—Wholesale business with industries and bulk purchases.
- 11—Seasonable articles covering fans, toys, Christmas tree lights.
- 12—Automobile, covering industrial, commercial and passenger motor vehicles.
- 13—Storage batteries and repairs on motor car electric equipment.
- 14—Supplies for automobiles.

Each group is capable of subdivision when necessary.

To determine the cost of work with accuracy is essential to success. Only in this way is intelligent bidding possible, and without it no knowledge can be had of results as work is progressing. It is on this point that the electrician working independently on one job at a time has an advantage over the Electragist running several jobs at once, who does not know the exact cost of each. The flat cost is not difficult to keep track of, but the flat cost must usually be raised 30 per cent. to 100 per cent. to obtain the complete cost. This difference consists of expense items and careful handling is necessary to attach them to the flat cost accurately. All expense items must be kept track of to give even a rough idea of complete costs. The simplest method is to find the total of all expense in a given period of time by means of one expense account and dividing by the sales to get percentage of expenses. When making estimates or finding selling prices profit and expense percentages are added and this sum taken from 100 per cent. The remainder is divided into the flat cost, using this formula:

$$\text{Selling Price} = \frac{\text{Flat Cost}}{100\% - (\text{Expense \%} + \text{profit \%})}$$

Example:

Flat cost of labor and material being	\$130.00
Total expenses being	25%
Net profit wanted	10%

$$\begin{array}{r} \text{Cost} \\ 1.00 - (.25 + .10) \\ \hline 130.00 \\ \hline .65 \end{array} = \text{Selling Price}$$

$$130.00 \div .65 = \text{Selling Price } \$200.00$$

It will be noted that the flat cost must be marked up about 54 per cent. to provide for 25 per cent. expense and 10 per cent. net profit.

It is a common and disastrous error to use the percentage of sales price to mark up flat costs, in spite of the many warnings that have been given against it.

The consideration of all expenses as one item is sufficient only for concerns doing a small and simple business or with executives of unusual capacity for details. Better control is had by dividing them so the expense of selling, labor, material and credit accounts, bear their proper share over and above that attaching to all the business done. Some expenses fall wholly in one of these items, but others must be split up for proper location.

The principles involved have been used to advantage in other lines of business and consist in the method of dividing certain expenses. A building account is used to take all housing items as rent, fuel, light or all costs of owning the building. This total is divided by the floor space and can then be attached accurately to the main activities of the business. In this way the cost of floor space used as sales room can be charged to selling and subdivided to sales groups according to the space used by them. Certain other items have only to do with material handled—others only relate to labor—others to credit accounts with customers—still others are of so general a nature that they must be charged as a percentage of all business done. This is shown more in detail below:

Expense Division.

Collection Expense:

Customers' cash discounts, bad debts, legal costs, salaries and expenses of collectors and bookkeepers, postage and office supplies used for billing and collecting, interest on value of accounts receivable, cost of space used by accountants. Total is divided by charge sales to give percentage.

Selling:

Advertising, publicity, commissions, salesmen's selling and traveling expenses, cost of floor space used for selling and display. Interest on selling equipment, signs, etc., and

goods kept for display. This account can be further divided to correspond with sales groups if desired.

Building Expense:

Rent, light, heat, cleaning, repairs, or equivalent costs of owned building. This account is charged to the expense accounts according to the square feet used.

Labor Expense:

Employers liability insurances, salary and expenses of superintendence, expense labor, interest on wages paid for and not charged to customers and on cost of tools, etc. Total is divided by direct labor to give percentage.

Material Expense:

Freight, express, cartage, insurances on merchandise, stock room salaries, interest on inventory, cost of space used. Credit for all cash discounts received. Total is divided by material used to give percentage.

Automobile Expense:

Maintenance of vehicles, interest, depreciation and insurance with cost of drivers and mileage record. Total is charged on mileage basis to proper account.

Financial Expense:

Interest on the entire capital used should be credited to profit and loss account and all of this amount not charged to the foregoing expense accounts as specified should be charged here; also interest on borrowed money and expense incurred to raise money.

General Expense:

Salaries, supplies and other expenses not above allocated, including balance of building, automobile and financial accounts if any remains of these after charging as indicated. This total divided by sales is general expense percentage.

It will be noted that this system of keeping expense accounts is capable of great refinement. When no subdivisions are considered, the complete cost is obtained by this means:

L = flat Labor cost plus labor expense.

M = flat Material cost plus material expense.

L plus M = Rough Cost.

Percentage* collection expense	C%
" sales "	S%
" general "	G%
" net profit "	P%

Gross Margin

C plus S plus G plus P

Referring to the former equation:

L plus M

$$1.00 - (C \text{ plus } S \text{ plus } G \text{ plus } P) = \text{Selling Price}$$

Example:

Labor cost	\$40.00
Labor expense (10%)	4.00
	\$44.00
Material cost	\$80.00
Material expense (7½%)	6.00
	86.00
Rough cost	\$130.00
Collection expense	6%
Sales expense	9%
General expense	10%
Net profit	15%
Gross margin	85%
Rough cost \$130.00	
	\$200 selling at flat price
1.00 — .35	

This system will give accurate results when all the business handled is of similar character, and the seller can set his own price on all of it.

Such conditions do not exist in practice. Most Electragists sell lamps, motors and appliances with a fixed margin which they do not control, and obviously the expense varies greatly. Even the concern who handles only one class of work must take jobs of different size and complexity which involve different proportions of expense.

With the division already indicated much can be done by careful study of the figures obtained and a rough approximation made of the variation of expenses for different kinds of

*Not used for cash transactions

work. Good business principles require that flat costs be kept of all sales handled, which in turn shows the gross margin, so the comparison of it with total expenses indicates what net profit is being derived from the business.

It is possible to learn quite accurately the basic cost of certain procedures without reference to the amount of the transaction, as for instance:

- Making a cash sale;
- Making a charge sale;
- Receiving a payment on account;
- Cost per month of each past due account.

A very common mistake is made in these matters by assuming that because the time used in these transactions is paid by the week or month a few more or less transactions will not affect the total cost. When a business is properly organized, each individual should be loaded with as much work as can be properly handled. Under these conditions more transactions can be handled by the same force for a short time, but in the long run it will cost more either as poorly done work, increased salary, or additional clerical help.

Increased Volume means Increased Expense

The argument is often made that a concern can increase its sales by so many dollars or so many transactions per month and not increase expenses proportionally. This is **never true** unless the organization is not well fitted to the business it handles. In fact, it is generally true that an increased volume of business imposed on a well organized concern will increase the percentage of its expenses. The increased discounts offered for large purchases compensates for this increase of expenses, but the existence of this condition should be kept well in mind when arranging for expansion of the normal volume of business handled.

Estimating the cost of regular transactions gives useful data for selling prices and also compels careful study of the routine used, so that short cuts and costs saving plans can be devised. The data obtained as to costs attaching to labor, material, credit accounts and to all business as sales expense and general expense, must be carefully considered in setting prices on goods and in deciding what volume of business will be handled of those lines where the mark up is fixed.

It is apparent that when other conditions are similar the greatest profit will be earned by the concern which is guided by accurate knowledge of its own costs, as it will get profitable business for which its competitors have asked too high a price and leave for its competitors the business on which they have made low and unprofitable prices.

Every business should be conducted on a plan covering approximately the volume of each kind of business that will be handled, the margin it will afford and expenses to be incurred in doing it. The plan should also include such changes in operation as should be made when the expected business can not be procured. By this means conditions of depression can be met without unnecessary loss and early advantage taken of revival. The plan referred to also affords protection against handling too large volumes of low margin business, and it also throws into sharp relief the effects of price cutting to increase volume of sales.

When speedy reduction of inventory is required, some help may be found in cutting established prices and necessary margins. However, very little electrical merchandise is bought because the buyer thinks it cheap. When cotton cloth or clothing is offered at abnormally low prices, people will buy it and keep it, but no so with wire or washing machines. The price cut stimulates but little new business and it makes a reduction in the margin needed to produce a profit that is hard to make up.

When considering the items which go into the expense

divisions, it is at once apparent the way in which quick turnover of merchandise and speedy collection of accounts bring the costs down. The merchandise expense formula is:

$$\text{Insurance} + \text{Interest} + \text{Floor Space, etc.}$$

Material Used

So, rapid turnover reduces this item in direct proportion. It is also reduced by convenient location, low rents, and insurance rates, and by skilful arrangement and handling of stock. Labor expense is reduced by mutual insurance, skill in overseeing and success in securing co-operation from employees.

Collection expense is a very unsatisfactory item because it seems in a way unnecessary; a 2 per cent. ten day discount does not eliminate it; 5 per cent. discount for cash on delivery or completion of work comes near to covering the cost of billing and collecting the average account.

The sales expense is more easily controlled than most other expenses and requires more care and judgment for proper adjustment. The selling expense of any particular group should vary with the margin it will yield. The amount permissible for publicity and salesmen respectively is open to question. Good practice seems to indicate that the total sales expense should take one-third to one-half of the margin. Perhaps it is inaccurate to charge the general expense as an even percentage over all kinds of business, but accurate allocation requires careful study. When close accuracy is wanted, each item entering the sales expense can be split according to the division of sales by approximating the proportion of it belonging to each.

Analyzing the general expense calls for the same process except that every item is first separated into sales, executing or accounting expense. It is not advisable to carry out this great detail continuously except in special cases, as the cost of doing it is considerable. However, it is worth many times the cost to keep the expense accounts in the manner indicated. In fact, it is quite as easy as to keep them as one account or to put similar items in one account regardless of the purpose of the expenditure which is the common method.

By placing the expenses in the accounts named, the percentage and other data are to be had when wanted. They can be subdivided to any extent required and in no other way can this data be obtained with equal ease and accuracy.

Most enterprises in this line have developed from small beginnings as contractor only with the supply business added gradually. No statistics are available as to the average life of concerns of this kind, but it is doubtless short, perhaps from three to five years. The reason for failure is generally lack of an intelligent plan of operation and records for checking results against it. A mental laziness pervades the trade which keeps otherwise capable men from the effort to master the rather elementary principles necessary to the keeping of accurate records.

The Merchandising End

The merchandising end of the business has logical connection with construction work. However, it is not likely to succeed without intelligent planning because the necessary commitments are more permanent than for construction work. Flash lights and batteries can be sold by a bookkeeper who is not busy without much expenses, but no profit is likely to be made on domestic appliances or similar business unless provision is made to handle it properly.

Our business is very modern and consists in supplying scientific apparatus to the public. We should avoid guessing when accurate estimates and correct data can be used. Have an intelligent plan and an accurate record and compare them systematically all the time. In simplest form this principle is: Know the detail of what you want to do and know the detail of what you are doing.

Appendix to previous article

Suggested Definitions.

Cost: Amount expended for material or service or their equivalent.

Flat Cost: Amount expended for direct labor and material used.

Rough Cost: Flat cost plus expense relating only to labor and material.

Complete Cost: Rough cost plus proper proportion of all expenses of the business.

Capital: Amount permanently invested in a business.

Capital earning is the annual net profit divided by the capital.

Capital impairment is the losses deducted from permanent investment.

Capital increment is the earnings permanently invested in the business.

Capital turnover is the annual sales divided by the capital.

Capital security of a business is above or below par (1.00) according to the probability of increment or impairment.

Expense: Amount expended in a business for items which cannot be included in flat cost.

Expense labor is service paid at hourly or daily rate and not included in flat cost.

Expense materials are those used in a business that are not included in flat cost.

Equipment: Appliances of every kind used in a business except stock for trade.

Inventory: Value of merchandise in stock.

Mark Up: Amount added to flat cost to make selling price.

Margin: Difference between selling price and cost.

Gross margin is difference between selling price and flat cost.

Net profit or net margin is the difference between selling price and complete cost.

Profits: The accumulated net margin of all sales in a given period as a month or year.

Percentages are always computed with selling price as divisor (unless otherwise specified).

Merchandise is material bought or carried in stock for sale.

Inventory turnover is cost of all merchandise used in a year divided by the average inventory.

Wages or labor is the amount paid to mechanics (mostly for production work on hourly or daily rate).

Merchandise rate is the number of months' supply carried in inventory.

(Divide inventory by cost of material used each month.)

Price is amount charged for anything. (Selling price.)

Sales is the aggregate price of all sales in a given period.

Sales rate is number of months taken to turn the capital over. (Divide capital by monthly sales.)

Receivables (accounts receivable) is the amount of sales unpaid for and collectible. **Receivable turnover** is amount collected in a year divided by the average value of receivables.

Salary is amount paid for non-productive service, mostly on weekly, monthly, or annual rate.

The word turnover is used always on an annual basis, indicating how many turnovers are made per year.

The word rate is used in reference to the number of months required for one turnover.

Selling Electrical Appliances

By F. W. Chapman, Hurley Machine Co.

The majority of salesmen have their mind so focussed upon the procuring of the order that they fail to give consideration to the two great essentials which are necessary to the realization of their desire and which go to make a successful salesman—a thorough knowledge of the appliance they are selling; a thorough understanding of the requirements of the prospective purchaser.

Too many salesmen have developed a stereotyped sales story on the appliance they are selling and expect every purchaser to conform to that, instead of accommodating their sales talk to the requirements of the purchaser.

The average dealer, for instance, is interested in building up a reputation—some for carrying high class lines and selling on quality—others for selling at an attractive price—or it may be some other objective, but until the salesman knows the

motive which is influencing the dealer in his business, he cannot talk impressively to him, or in a way in which it will command his interest or have the right appeal.

It is necessary, first of all, to secure the dealer's confidence. This is the foundation stone of business building and until you have that confidence, it is difficult to procure orders. You must know wherein you can particularly appeal to the dealer on your appliance.

The same common sense fundamental applies to the dealers' salesmen when presenting the merits of his appliance to the housewife who comes into the store. The first thing necessary is to find out her problem—tell her how she can best meet it, and you will immediately gain her confidence which is a big step towards procuring the order. A great many electrical appliances are more or less new to the average woman. She does not know what to demand in the purchase of an appliance.

A man in purchasing an automobile has certain requirements in his mind. He probably wants demountable rims, overhead valves, or valves in a port in the side. Experience or inquiry has told him what to demand and why he wants it. If you were to ask the average woman what she should require in a washing machine and why, it is altogether likely she could not tell you. It is therefore, very important that you first have this information yourself so that you will be in a position to mould her opinion and explain to her what to look for in making her purchase.

of the family and how the washing is being done, then tell her definitely how much better she can do it with the washer. Then you have got to prove to every prospective customer that there is a good reason for buying your appliance. If you fail to do this you leave an opportunity for some other salesman, knowing his business, to sell her on the reason why she ought to have his machine.

I would suggest that you sit down and list the reasons why the dealer or housewife, from his or her point of view, should purchase what you are selling, and you can rest assured if you are not able to do so, and believe yourself that your appliance will meet the requirements better than any other, you are losing a whole lot business which you might get, and you want to get busy, and get somebody who does know to give you the information.

The Canadian Comstock Company, Ltd., has been awarded the contract for the electrical work in connection with the new building being erected for the Canada Cement Company, Philips Square, Montreal. The general contractors are the George A. Fuller Company and the architect is E. I. Barott.

Exports of electric motors from the United States in 1920 were valued at \$13,420,076. In 1919 the total was \$10,635,476. Canada was the largest buyer in both years, taking 18 per cent. of the motor exports in 1920 and 15 per cent. in 1919. Japan came second in both years and Great Britain third.

The Canada Gazette announces the incorporation of The Canadian Shade Company, Ltd., with a capital of \$200,000 with head office in the city of Toronto. The new firm will carry on an electrical contractor-dealer business.

The Ontario Gazette announces the incorporation of the City Battery Shop, Limited, with a capital of \$50,000 and head office at the city of Toronto. The firm will manufacture and deal in storage batteries, dynamos, motors, etc.

Henry Engineering Co., electrical distributors, 71 Bay St., Toronto, have mailed an interesting little booklet, *Power Renewable Fuses*.

Are You Original?

**Ernie Drury is — And, on occasion,
he Turns it into Income**

Originality is a great asset to the electrical dealer. Doing something a little out of the ordinary shows the people you're "different"—that you do your own thinking. Nine cases out of ten they conclude that you know your business and become convinced that what you say and do is right—as it generally is. When you get the people to the stage where they have confidence in you they will "buy" out of your hand. That's salesmanship!

Ernie Drury, out on Danforth Avenue, Toronto, is full of new ideas and occasionally when the cash box begins to show signs of depletion he puts one into effect. Usually his staff consists of Ernie (himself), Mrs. Drury, and an assistant, but a week ago he decided to branch out, and one day took on fifty-eight new salesmen. Fortunately, they are on commission, so that though large profits are in prospect, the overhead is kept at a minimum.

You are interested in hearing about Ernie's scheme? Well, here it is:

On August 12, 1921, when E. A. Drury decided to increase his staff—and his profits—he looked about for a few "live ones." Now, there is no species of the human race more wide awake or more shrewd than the newsboy on the corner, and Ernie approached him with this question: Are you making all the money you want? No! Well, listen to this:

What Mr. Drury Offered the Boys

I am starting a Newsboys' Sales Contest. Every boy entering will be supplied with a letter to deliver to each of his customers, with every paper, for the week commencing August 15th. Each of these letters will tell your customer that you have entered our contest, and will ask them to give you their order if they need anything in the electrical line; you can get the order any time before the contest closes—Saturday, August 27th. The goods on these orders will be delivered by us and you will have sales credited to you.

On every sale you will get 10 per cent. profit. That means

A Washing Machine at \$235, you will have \$23.50 profit. And so on. No matter what you sell you get a profit, but in addition we will give prizes as follows:

1. \$25.00 to the boy whose sales are the greatest in excess of \$100 for the two weeks from August 15th to the 27th.
2. \$10.00 to the boy whose sales total second highest, providing they exceed \$100.00.
3. \$10.00 to the boy who first sells \$100.00 worth of goods.
4. \$10.00 to the boy who first sells a Vacuum Cleaner or Electric Washing Machine.
5. \$5.00 to the boy whose sales total third highest, providing they exceed \$100.00.
6. \$5.00 to the second boy selling a Vacuum Cleaner or Electric Washer.

Only one prize to be won by any contestant.

Mr. Drury also explained that while the primary object of this offer was to sell his electrical equipment, it was also a splendid opportunity for the boys to develop their talents as salesmen.

As explained above, a different letter was supplied to the

TELEPHONE GERRARD 7312 111 DANFORTH AVENUE

E. A. DRURY
ELECTRICAL CONTRACTOR
TORONTO

Dear Mailman

The time has come when Electric Washing Machines are "HOT".

Think of the hard work it saves. With an Electric Washing Machine you can eliminate all the fussing, wringing, hard on the operator and hard on the clothes. The machine will both wash and spin—just turn on the current. The cost of current for an average family washing will not exceed five cents. You can't find a fairer deal with an electric washing machine anywhere.

We have them to sell at \$199.00, \$145.00, \$109.00, \$200.00, and \$235.00, so can surely satisfy.

Sell your newsboy letter to each of your customers, and we will do the rest.

Yours very truly,
E. A. Drury

NEWSBOYS' Sales Competition

I have a letter to deliver to each of my customers about your Electric Sales Contest.

A typical letter in Mr. Drury's campaign

boys each day. One day it made special reference to a washing machine; another to a vacuum cleaner, and so on; the Saturday letter was a sort of summary of the whole week and was designed to give the housewife a wider outlook on the possibilities of electrical appliances in the home.

The results of the campaign are not yet known, but will be explained in our next issue. As this is written the contest is waxing hot, and the Danforth district promises to be the electrical centre of the city.

It's the only way, boys! Business is slow—every kind of buyer is holding back. The public must be coaxed a little. Ernie Drury and others like him are doing their share of the coaxing.

Let's all fall in line and do something original.

NEWSBOYS ELECTRICAL SALES COMPETITION

Name Mr. Mullen Willie

Address 62 Drayton Ave.

Age 13 Phone No. _____

Papers Delivered Telegram Star How Many 105

District covered Danforth Drayton
Coxwell, Hillingson Stary
Hanson Bastedo

I desire to enter your Sales Competition, and would, if chosen, report to you on Friday, August 15th, and continue to do as requested until the contest closes, on August 27th.

I have read conditions on attached form and agree to abide by them.

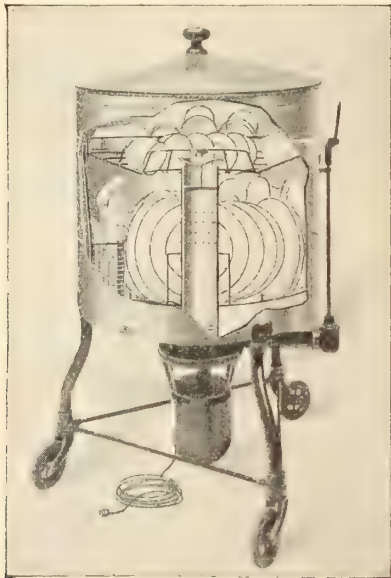
The Boys' Application Form

that if your customer will only order one lamp at fifty cents you will have five cents profit.

- If 5 lamps at 50 cents, you will have 25 cents profit.
- An Electric Iron at \$6, you will have 60 cents profit.
- An Electric Iron at \$8, you will have 80 cents profit.
- A Vacuum Cleaner at \$60, you will have \$6 profit.
- A Washing Machine at \$100, you will have \$10 profit.
- A Washing Machine at \$125, you will have \$12.50 profit.

New Dishwasher on Market

One of the latest appliances to be placed on the household market is the Quaker dishwasher, distributed through the Quaker Dishwasher Sales Co., 240 Cherry Street, Philadelphia, Pa. This dishwasher is made in two styles, one a portable machine on wheels, as shown in the illustration, the other a combination porcelain top kitchen table with the washer on a shelf below, thus combining two articles. As the table top is hinged, it facilitates the inserting of dishes. The tank used is 20 inches in diameter, making a large receptacle for holding the dishes. Using 8 quarts of hot suds and operating the machine



3 minutes will wash the dishes thoroughly, according to the claim of the manufacturer. Other points in construction are the noiseless gears, lack of vibration, and absence of complication. An unusually small motor is required, the one used being a Westinghouse type ADS Universal motor, which will operate on any circuit from direct current to 60 cycle alternating current at its rated voltage. This small motor keeps the operating expense of the dishwasher very low.

Sangamo Portable Test Meter

The Sangamo Electric Company has recently placed on the market an improved type of portable test meter, intended for checking the accuracy of Sangamo and all other makes of service-type watt-hour meters. The advantages of using this type of meter for testing are readily understood when it is realized that no indicating instruments or stop watches are necessary, and variations in the load and voltage are automatically eliminated. The moving system of this meter is essentially the same as used in the Standard Sangamo Type "H" Meter, except for modifications of the current and potential windings which are necessary to obtain the various ranges of the standard.

The meter is designed to combine a number of capacities in one case, the changes in capacity being effected by the rotation of a drum controller of special construction being operated by means of a dial switch mounted on the cover as shown in Fig. 1. The range in capacity covers practically all the standard capacities now in general use, namely, 1-5-10-25-50-100 amperes. Contrary to the usual practice for higher capacities, the current, instead of being carried by single-leaf brushes having a single-line contact, is carried by multiple-leaf brushes bearing down with considerable pressure on two sides of a flat disk. This construction

possesses the advantage of having much greater contact area, and with the pressure available the contact resistance and possibility of heating are reduced to a minimum. For the lower capacities the usual leaf brush is utilized. The entire drum mechanism is extremely simple, and the arrangement of moving parts such that they may be easily inspected. The standard meter is arranged for 110 and 220-volt operation, the changes from one voltage to another being accomplished by means of a rotating switch. When additional voltage ranges are required, multipliers similar to the one shown in Fig. 3 are used. The register is of the three-pointer type. The large circle represents a single revolution of the disk and is divided into hundredths. The two smaller pointers make one revolution for each 10 and 100 revolutions of the disk respectively. A resetting device is provided consisting of a small button on the top of the case and so arranged that upon applying a slight pressure the hands are immediately returned to zero, eliminating the necessity of taking the differences between successive readings in order to obtain the number of

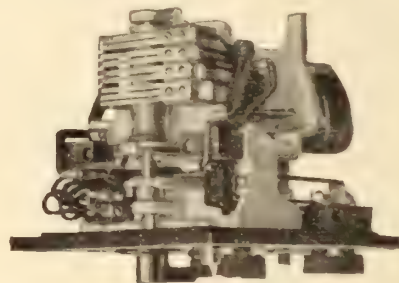


Fig. 1



Fig. 3



Fig. 2

revolutions for a given test. A simple sealing device is provided which will enable testing laboratories to seal the meter against any possible tampering by unauthorized persons.

All moving parts, including the vertical staffs of the register, operate in jewel bearings. The main spindle is held in position by a ring jewel where it passes up through the train plate, thus insuring against possible wear. Friction has been reduced to a minimum in the entire moving system, insuring sustained and permanence of calibration under all conditions of service.

The Inspection Department, Hydroelectric Commission, Brantford, has accepted the tender of the P. H. Secord & Sons Construction Co., Ltd., of \$11,000 for the erection of an addition to the Greenwich sub-station. Excavation is now under way.

The Bathurst Electric Light Company, Bathurst, N. B. has received permission from the New Brunswick Public Utilities Commission to reduce their rates from twelve to eleven cents per kilowatt hour.

Organization Campaign Gathering Impetus

Ontario Towns making Enthusiastic Response to Mr. Stalford's Efforts to Organize the Whole Province into One Powerful Unit

The Windsor Meeting

The electrical contractors and dealers of the Border Cities held a meeting in Windsor on August 8th, 1921, to consider the formation of a district organization of the Ontario Association of Electrical Contractors and Dealers. M. J. McHenry, manager of the Walkerville Hydro-electric System, occupied the chair. K. A. McIntyre and V. K. Stalford addressed the meeting on association work. At the conclusion of these addresses the chairman spoke briefly on the matter and advised the contractor-dealers to become members and form their district organization immediately, with the result that several applications were received.

All those in attendance at the meeting appeared to show great interest in the work, and the success of the association seems to be already assured.

The following firms were represented at the meeting: McNaughton-McKay Electric Company; Electric Supply Company; W. Lefave; Peoples Electric Company; Canadian General Electric Company; A. H. Cook and F. N. Woods; all of Windsor. Norbar Mfg. Company, Walkerville, and Walkerville Hydro-electric System, Walkerville. Mr. K. A. McIntyre of Toronto, and Mr. V. K. Stalford of Hamilton.

Stratford District in line

On August 11th the electrical contractors and dealers of Stratford held a meeting. W. Bennington occupied the chair. A. Tubbins of the Canadian Edison Appliance Company, and V. K. Stalford, Hamilton, addressed the meeting on association work. At the conclusion of the address several applications for membership in the Ontario Association of Electrical Contractors and Dealers were received.

And Brantford also

The electrical contractors and dealers of Brantford held a meeting on Friday, August 12th. T. J. Minnes occupied the chair. K. A. McIntyre and V. K. Stalford attended the meeting and gave addresses on association work. At the conclusion of the meeting the members of the Telephone City Electric Club passed a unanimous vote of confidence in the Ontario Association of Electrical Contractors and Dealers, and advised all of the contractors and dealers in Brantford to become members of the association. Several of the members of the Telephone City Electric Club submitted their applications to become members of the association at this meeting.

The London Meeting

The Electrical Contractors and Dealers of London held a "get together" meeting in the Builders Exchange on August 16, 1921, at 2 p.m. W. G. Bendle of the Northern Electric Company occupied the chair. V. K. Stalford was in attendance and addressed the members on association work and the results obtained in the rest of the province during the campaign. Several of the members requested further information on the subject, which is to be furnished at a second meeting to be called in the near future. Some of the contractors expressed their intention of paying a visit to hear W. L. Goodwin in Toronto on August 22nd. The following firms had representatives at the meeting: J. H. Pollock; W. R. Bowley, Bowley Electric Co.; L. R. Folley, Commercial Electric Co.; J. Winegarden, Peoples Electric Co.; W. H. Morgan, Canadian General Electric Co.; W. G. Bendle, Northern Electric Co., Ltd.; H. S. Wilcox, Benson-Wilcox Electric Co.; A. T. Taylor, Taylor-Campbell Company.

The Niagara Peninsula

The contractor-dealers of Niagara Falls, Welland and St. Catharines held a get-together meeting on August 19, at 2 p.m., at the Trennick Hotel. F. W. Carter acted as chairman. Several firms had representatives present at the meeting. V. K. Stalford addressed the meeting on association work throughout the province. At the conclusion of Mr. Stalford's remarks Wm. Simpson of Niagara Falls moved a vote of confidence in the Ontario Association, seconded by F. G. Sage of Welland, which was adopted unanimously. A motion was moved by Jno. Frampton of Niagara Falls and carried unanimously, that another organization meeting be held on September 14, at 2 p.m., in St. Catharines, and an invitation sent to K. A. McIntyre, the chairman of the Ontario Association, to address the meeting and complete the organization of the district. The chairman requested all who were present to attend the next meeting and bring along any other contractors in their district. The following attended the meeting: Fred. E. Carling, St. Catharines; Fred. W. Carter, Niagara Falls; J. C. Clifford, St. Catharines; Wm. Simpson, Niagara Falls; B. E. Upper, Niagara Falls; W. P. Dixon, Niagara Falls; F. G. Sage, Welland; Jno. Frampton (J. H. Sandham Co.), Niagara Falls.

Northern Electric "Athletic" Picnic

Continuing its policy of constructive optimism, the Northern Electric Athletic Association, Montreal, held its annual picnic at King Edward Park on August 6th, with an attendance of fifteen hundred enthusiasts.

Ideal weather conditions prevailed, which particularly enhanced the sporting features of the outing. An extended programme was run off for all ages of both sexes, with attractive prizes that were keenly contested for.

Among prize winners may be mentioned Bill Brebner, the famous rabbit chaser, who left them at the post in the 100 yards dash; Jimmy Gill, who copped in the sack race, and the ancient Dick Walker, who staggered home in the 100 yards for men over 45 years.

Several near-winners were conspicuous, including the perennial "Bill" Carter, who slipped on a pebble rounding the stretch of the fat men's race, and Charlie Lortie, the N.E.A.A. hard-working president, who, failing to land a prize for the first time in the history of the Northern Electric picnics, would not agree that advancing age was the cause.

A feature event was the mile relay, beautifully run and easily won by the Merchandising Department's quartet (Cullen, Carruthers, Shea and Campbell).

Dancing was indulged in at intervals, and all went home via Steamers "Imperial" and Boucherville," satisfied with a fine day's outing.

The Canada Electric Co., 175 King St. E., Toronto, have been awarded the contract for electrical work on a new bank building being erected at Brunswick & Downie Sts. for the Bank of Montreal at an approximate cost of \$43,000.

As a result of the extremely hot weather recently dealers are completely sold out on electric fans. One firm stated they have sold more fans in one day than during the whole of last year.

First Electrical Convention in Nova Scotia a Most Successful Beginning

The first convention of the Electrical Association, Province of Nova Scotia, was held in Halifax on August 16-17. Mr. William Murdock, manager of the Maritime branch of the Northern Electric Co., and president of the association, occupied the chair throughout the proceedings.

This association was formed in Nova Scotia with the object—first, of getting electrical men together, and, second, that the electrical message may be placed more intelligently, more effectively and more attractively before the general public. In both respects the Convention indicates that much progress has been made. The attendance was very satisfactory and was drawn from all parts of the Maritime Provinces as well as from a number of western points. In the matter of publicity, the newspapers of Halifax had apparently been well advised beforehand of the importance of this gathering—a feature of electrical conventions that cannot be over-estimated. It is the public that must be reached ultimately and there is no other medium for this purpose so valuable as the daily or weekly paper.

Prominent men in the electrical industry from all over the Maritime Provinces took part in the proceedings, and at one stage or another contributed to the discussions and suggestions. Hon. C. H. Armstrong, Commissioner of Works and Mines in the Nova Scotia Government, spoke more particularly of the work of the Nova Scotia Power Commission and their policy of hydro-electric development. One of the features of the convention, by the way, was a visit to the St. Margaret's Bay plant, which is at present under construction. Mr. Armstrong stated that Nova Scotia had a fair measure of possibilities in the way of water power, and that they also had what no other province in Canada had, namely, a dependable rainfall.

The subject of illumination was taken care of by D'Arcy Ryan, whose address on "Lighting, Ancient and Modern," with his wonderful illustrations, which have already been seen at many points on the continent, was very much appreciated. W. L. Goodwin and S. A. Chase spoke on the necessity and advantages of co-operation in the industry. Eugene Vinet, secretary of the Canadian Electrical Association, urged the necessity of Dominion-wide organization. C. C. Curtis, manager Cape Breton Electric Company, Sydney, replied to the toast to "Our Guests." W. H. Hays, assistant manager Maritime Telegraph & Telephone Company, enlarged upon the idea of getting together. W. L. Weston, general manager of the Nova Scotia Tramways & Power Company, spoke of the comprehensive constitution of their association. It was not intended to be a local affair, but to include the whole province. If similar associations were formed in the other provinces one large Maritime association might result. Another speaker was C. H. Wright, Maritime manager of the Canadian General Electric Company, who was an active worker in the interests of the association's convention.

A feature of the Nova Scotia Association, as pointed out by Mr. Murdock, is the inclusion of architects in its membership. Mr. Murdock explained that the co-operation of the architect is very essential before our homes can be properly wired and the use of electrical appliances can become general. He believed that architects were as eager to become advised of the advantages and of the uses of electrical appliances as were electrical men themselves, and that as a result of architects being brought into their association a much more effective and more economically co-ordinated result would be obtained.

A large number of out-of-town members were in attendance at this convention, among which were the following:

H. F. Archibald, Truro; S. E. Bonner, Parrsboro; W. S. Brown, St. John; H. J. Campbell, Bridgewater; S. A. Chase,

New York; C. M. Chisholm and wife, Wolfville; A. B. Cooper, Toronto; C. C. Curtis, Sydney; W. H. Dance, Amherst; R. E. Davis, London, Ont.; A. G. Ellis, North Sydney; Fred Fox, Windsor; Jas. Fraser, Pictou; O. R. Frizzell, Glace Bay; J. W. Glover, Stewiacke; W. L. Goodwin, New York; E. W. Gibbon, Moncton; S. D. Herman, Lunenburg; E. W. Jeffrey, Truro; Geo. Kerlim, Montreal; D. Logan, Toronto; L. G. MacKay, Sydney; J. P. McLean, Antigonish; C. A. McLaren, Moncton; G. T. Medforth, Amherst; J. C. Mitchell, Wolfville; W. H. Murray, Springhill; E. D. Murphy, Sydney; G. A. Nicol, Mahone; C. T. Nisbet, St. John; F. J. Nisbet, St. John; R. Perry, Moncton; F. A. Pimple, St. John; Mr. Pippy, Springhill; H. W. Rafus, Truro; C. McD. Smith, Sydney; E. Summers, Wolfville; G. M. Totten, Sydney; Eugene Vinet, Montreal; Mr. Wilson, Boston; C. H. Wright, Wolfville.

The success of Nova Scotia's first electrical convention cannot be questioned. The chairman states that this will be the first of many, but that Halifax has no desire to monopolize them. The matter of the location of the next convention will be considered by the Executive and suggestions are in order.

Toronto Contractor-Dealers Hold Rousing Meeting and Improve Understanding

An interesting meeting of contractor-dealers was held in King Edward Hotel, Toronto, on Monday evening, August 22. As announced in our last issue, the Ontario executive had appointed a number of district chairmen, and it was primarily for the purpose of getting these men together and talking over the situation that this meeting was planned. It was, fortunately, timed with the return of Messrs. W. L. Goodwin and S. A. Chase from the Halifax convention, so that these gentlemen were able to be present.

Mr. K. A. McIntyre, the chairman of the Ontario Association of Electrical Contractors and Dealers, occupied the chair, and two points of particular interest were discussed. The first was the feasibility of establishing a flat rate for the sale and installation of electric ranges. The second had reference to cut-price campaigns, such as have either been inaugurated or proposed by a number of Canadian manufacturers from time to time.

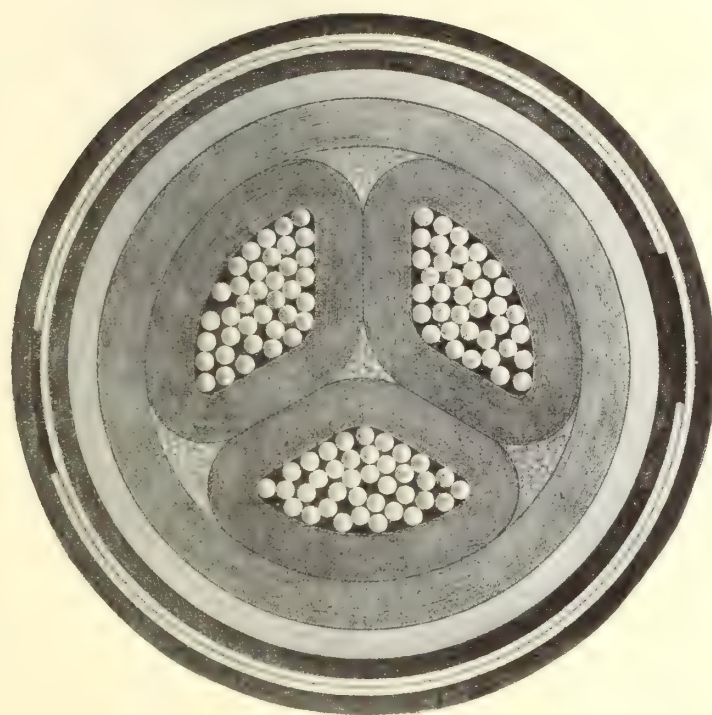
A Flat Rate for Ranges Installed

A number of members voiced their dissatisfaction with the policy of certain municipalities in establishing too low a price on ranges installed. Mr. Goodwin took a hand in the discussion and urged the entire practicability of the fixed price policy. He pointed out that gas stoves, and many other things, had always been sold on this basis. So long as the price fixed included the necessary overhead, depreciation and profit, there could be no objection to the policy. He did not, of course, approve the municipalities maintaining their own installation staffs when contractor-dealers were available who would do this work, and he suggested in every case that the contractor-dealers in any town should confer with the manager of the municipal enterprise, and give him the value of their experience in the way of cost data, so that he might arrive at a correct figure of cost and an arrangement might be made whereby the contractor-dealers should agree to carry out this work for the municipality at this figure. He did not believe any municipality could have any object in installing ranges at less than cost. They desired, and required, a profit, just as the individual dealer did, and hence would not knowingly fix the price at a figure that would not be as satisfactory to the individual dealer as to themselves.

Price-cutting Campaigns by Manufacturers

As a result of business depression and the so-called buying strike, certain manufacturers of electrical equipment have planned to keep their factories running by applying an artifi-

POWER CABLE



350,000 C. M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable

Overall Diameter—3.62 ins.

*Built to Specification of Hydro-Electric Power Commission
of Ontario*

Eugene F. Phillips Electrical Works, Limited
Montreal

*The Oldest and Largest Manufacturers of Bare and Insulated Wires and Cables
in the British Overseas Dominions*

cial stimulant to the trade in the way of "price-cutting." Such campaigns have been carried out in the past by certain manufacturers; others are announced at the moment, and still others are promised for the near future. The discussion turned rather on the wisdom of this general policy and, if it were wrong, the best remedy for the disease. Here again Mr. Goodwin's wide experience was of great value to the members. He expressed himself as absolutely opposed to the policy of cutting prices, but he pointed out the inadvisability of boycotting any individual manufacturer—first, because it cost the contractor-dealer real money to change his account, and, second, because he had no guarantee that the second manufacturer would not offend likewise, in which case he would be driven on to a third, and so on. Mr. Goodwin also pointed out that to send a resolution to any manufacturer—as was suggested by a number of the members—expressing the disapproval of the contractor-dealer in general, would carry little weight with that manufacturer, because these various dealers handled various makes of appliances, and no manufacturer cared a snap for the opinion of a contractor-dealer who was handling somebody else's product. What he urgently suggested—and this was afterwards done—was that when a manufacturer was considered to be overstepping the ethics of merchandising, a committee should be appointed from among, and by, the dealers who were handling this manufacturer's particular product and that they should meet this manufacturer in conference, point out the views of their fellow-dealers and reach an amicable arrangement for future operations.

Many Out-of-town Members Present

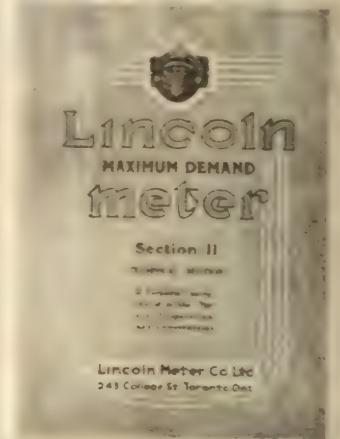
The meeting was well attended and included a number of out-of-town delegates, among whom were the following: F. O. Ellis, Ellis & Howard, Ltd., Kitchener; O. S. Leyes, the Doerr Electric Co., Kitchener; Geo. Bremner, Starr Electric Co., Kitchener; A. E. Dannecker, Electric Service Co., Waterloo; W. P. Dixon, Niagara Falls; Joseph Mallett, Mallett & Bierwagen Electric Co., Kitchener; J. H. Sandham, J. H. Sandham Co., St. Catharines and Niagara Falls; W. R. Cowan, Cowan Electric Co., Peterboro; Mr. Ash, Ash & Holmes, Peterboro; J. H. Miller, Miller, Powell & Watson, Peterboro; Geo. E. B. Grinyer, the Grinyer Co., Ltd., Guelph; J. Culley, Culley & Breay, Hamilton; Jas. Winegarden, People's Electric Co., London; W. G. Jack, Jack Brothers Electric Construction Co., Hamilton; V. K. Stalford, Hamilton; Mr. Grant, Grant & Sharpe, Peterboro.

New Lincoln Catalogue

The Lincoln Meter Company, Ltd., 243 College Street, Toronto, manufacturers of the Lincoln Maximum Demand Meter, announce that they now have a series of catalogues covering this product ready for distribution. The catalogue is divided into five sections. No. 1, Commercial; No. 2, Technical; No. 3, Installation; No. 4, The Lincoln Graphic; No. 5, The V A D Transformer.

Section 1 gives non-technical reasons for using the Lincoln meter, arguing from a financial standpoint, primarily; there is also included a simplified study of rate making; how the largest parts of bills are now estimated; how Lincoln meters put billing on a measured basis and, finally, some testimonials. Section 2 gives technical reasons for the use of this meter, explaining the principles underlying its operation; how it measures; how it is made; how adjusted, and special features of construction. Section 3 is a description of the mechanical parts, with connection and dimension diagrams; testing diagrams and charts; transformer details, and information regarding ordering. Section 4 discusses the similarity of indicating and graphic types, comparing the two types of load and the reasons

for the Lincoln graphic. Comparisons are made of various graphic meters and meter charts, and a complete description of the meter is given. Section 5 tells of the equitable distribution of fixed charges by the measurement of volt amperes rather than watts; discusses the phase shifting transformer, its design,



construction and operation; vector diagrams of voltages involved in volt-ampere demand measurement.

The illustration herewith shows Section 1 and Section 2 of these catalogues. Any one or all of the five may be obtained upon applications to the company.

Mr. Wilson Sales Manager of Earle Electric

Mr. Arthur E. Wilson has been appointed sales manager of Earle Electric, Limited. Mr. Earle recently took over the agency of the Sweeper-Vac cleaner and this, among other things, will have Mr. Wilson's experienced attention. In coming to



the Earle Electric, Mr. Wilson leaves the Canadian General Electric Company after twenty-six years of service as a sales man. He is consequently one of the best-known men in the province of Ontario, and one of the best liked.

A Big Order

The Eureka Vacuum Cleaner Company have just formally secured an order from the American Purchasing Corporation of Toronto for thirty-six Eureka cleaners to be used in the King Edward Hotel, Toronto. These same people purchased twelve last October, making in all a total of forty-eight Eureka's in use in the King Edward Hotel.

Rubber Covered Wires and Cables

FOR POWER, LIGHT AND TELEPHONE WORK

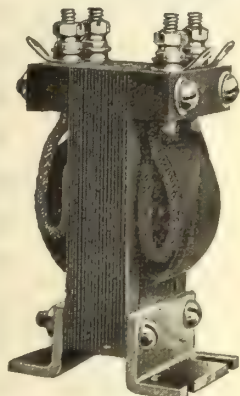
Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

Prompt Shipments from Canadian Factory.

BOSTON INSULATED WIRE & CABLE CO., Limited

Canadian Office and Factory, HAMILTON, ONT.

FEDERAL RADIO ACCESSORIES



No. 226-W IS THE MOST-EFFICIENT AUDIO FREQUENCY TRANSFORMER ON THE MARKET

UNEXCELLED
IN
AMPLIFICATION

No. 226-W Audio Frequency Transformer

Write for Bulletin 102-WB describing

Audio Frequency Transformers, Telephone and Detector Jacks and Plugs, Automatic Filament Control Jacks, Anti-Capacity Switches, The Liberty A. & N. Type Head Telephone, C.W. Microphones for Radio Telephones, C.W. Filter Coils, C.W. Filament Heating and C.W. Transformers, C.W. Grid Resistance Units.

Manufactured by

CENTURY TELEPHONE CONSTRUCTION CO. Inc.
BRIDGEBURG, ONT.



These Fixtures Sell Quickly

Dealers are reporting splendid profits with this new line of fixtures. They say that the many artistic designs and undeniable quality quickly catch the eye of the customer. A sale immediately results.

Why not write for details?

Canadian Electrical Supply Co. Ltd.

Distributors

165 Craig Street West, Montreal

Quebec Branch: 28 St. Joseph Street

ELECTRICAL

men with training are in demand. For more than a quarter of a century, this school has been training men of ambition and limited time, for the electrical industries. Condensed course in Electrical Engineering enables graduates to secure good positions and promotions. Theoretical and Practical Electricity, Mathematics, Steam and Gas Engines, Mechanical Drawing. Students construct dynamos, install wiring and test electrical machinery. Course with diploma, complete

IN ONE YEAR

Thoroughly equipped fireproof dormitories, dining hall, laboratories, shops. Over 8000 men trained.

Write for catalog. 29th year opens Sept. 28th, 1921

BLISS ELECTRICAL SCHOOL
323 Takoma Avenue, WASHINGTON, D.C.



We Specialize in the Manufacture of

**CARBON, GRAPHITE,
METAL—GRAPHITE
BRUSHES**

For ALL TYPES of
Motors and Generators

ORDERS SHIPPED PROMPTLY

DOMINION CARBON BRUSH CO.

38 Duke Street
Toronto

Montreal Representatives
A. H. Winter-Joyner, Limited



Hotpoint
Combinations

Regularly ~~\$16.00~~ **PLUS**

Regularly ~~\$8.00~~

This cut appears in 35 leading dailies September 16th and 17th at head of a 600 line advertisement.

Sell them two—

That's the gist of the combination selling that we are advertising in connection with our

September 16th, 17th and 19th Sale

Big advertisements will appear on these dates in the 35 largest dailies from Atlantic to Pacific, telling your customers about this money-saving opportunity and the special Iron sale.

Here's How It Works—The Hotpoint cord and plug is O.K. for the Hotpoint Percolators, etc. So, sell your customers **two appliances with one cord**. Hold the second cord in stock. During the 3-day September sale it would figure like this:

IRON AND PERCOLATOR \$19.00

Hotpoint Iron regularly \$8.00; Aluminum Percolator regularly \$16.00; Total \$24.00. During the September Sale, Iron Special at \$5.00, and Percolator, less cord, \$14.00, making a total of \$19.00.

Your customer saves \$5.00. You make your normal profit on Percolator.

BOUDOIR SET AND IMMERSION HEATER

The Boudoir Set sells regularly at \$10.00; the Immersion Heater at \$8.00; Total \$18.00. But during the sale the price of Boudoir Set is \$7.25; Heater (less cord) \$6.00. This gives you a special combination price of \$13.25 and saves your customer \$4.75, although you make your normal profit on the Heater.

This Plan Makes Friends for You

Yes, it makes friends for your store—it clears your shelves so you can order fresh goods for Christmas—it boosts your September sales.

If you haven't yet ordered your free window trim material (\$200.00 in prizes) and other advertising supplies, let us have your requirements at once.

Orders for Irons accepted at special prices till Monday September 19th.

Canadian Edison Appliance Co., Limited
Stratford, Canada



The Link-Key Chain Plier

The only practical patented device that will open and close any size links without injury to the finest finish.

It's like an extra man around the shop. Made of pressed steel, nickled.

Let us send you information.

Pat. in Canada April 20, 1920.

Pat. in U. S. A. November 4, 1919.

MAYHEW TOOL COMPANY

WILLIAMSTOWN, Mass., U.S.A.

BENSON-WILCOX ELECTRIC CO.

LONDON - - CANADA

DISTRIBUTING JOBBERS

Try Us for Service

**ELECTRICAL SUPPLIES
FIXTURES-MACHINERY**

MOST COMPLETE Stock IN CANADA



No. 2112

Do you believe in foot candle meter readings? If so, sell

CORA LITES

*Adopted by Public Schools of Pittsburgh, Pa.,
after testing 74 units.*

A design and shape for every job. A demonstration is a sale.

Send order for sample unit—we will also send you catalogue of complete line of CORA LITES.

Packed in individual cartons.

**Consolidated Lamp & Glass Co.
CORAOPOLIS, PA.**

R. E. DAVIS, Canadian Representative.
113 Wortley Road, LONDON, ONT.

*We are now making all leading patent
units of Cora Glass. Is yours among them?*



No 1170



No. X1637



No. 2119

FOR SALE

Almost new 150 k.w. General Electric Generator, 25 cycle, type A. T. B., 550 or 2,300 volts, 500 R.P.M., form B, class 5-150-500. Write Gray-Dort Motors, Chatham. 14-18

POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 652, Electrical News, Toronto. 17-1f

Appeal by Company is Dismissed

Word has reached Victoria that the \$85,000 suit of the British Columbia-Wellington Collieries against the Pacific Coast Coal Mines, which was taken to the Supreme Court at Ottawa some months ago by W. Alexander Brethour, of Eberts and Taylor, representing the Pacific Coast Company, has been won by the latter and the appeal of the Collieries has been dismissed.

The case has been considered in the courts of British Columbia during the last year. The Pacific Coast Company finally won out in the Court of Appeal here. H. B. Robertson went to Ottawa to carry the appeal of the Collieries to the Supreme Court. The Collieries claim-

ed \$85,000 damages from the Pacific Coast Company for encroachment and taking coal unlawfully from their properties. Mr. Brethour for the latter claimed that they had the consent of the Collieries and his plea was successful. Justices Boodeur and Mignault dissented from the judgment.

DIRECT RESULTS

In securing new contracts are reported by users of MacLean Reports service. We are daily receiving letters like the following from BUILDING and ENGINEERING FIRMS:—

We are well pleased with the service you are giving us, and can trace considerable business directly to your reports.

Yours truly,

PEASE FOUNDRY CO., LTD.

Why not take advantage of the service that is proving worth while to hundreds of well-known firms. Get definite news of new prospects from MacLean Building Reports.

Write for full information

MacLean Building Reports, Ltd.
345 Adelaide St. W., Toronto

Phone Ade. 778

MacLean Building Reports, Ltd.

345 Adelaide St. W. - - Toronto
119 Board of Trade Bldg. - Montreal
348 Main St. - - - - Winnipeg
212 Winch Building - Vancouver

WANTED—Someone to take charge of healthy boy 14 years of age who would like to learn the electrical trade. Address Box 635 Electrical News, Toronto. 16

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710		Wagner
" 1	75	3	25	550	480		Westg.
" 1	60	3	25	550	750		Cr. Wh.
New 2	52	3	25	550	720		Lanc.
Used 1	50	3	60	550	970		Westg.
Used 2	50	3	25	550	720		Westg.
New 2	35	3	25	550	720		Westg.
Used 1	30	3	25	550	1500		Tor & Hm
" 2	30	3	25	550	750		F.-M.
Used 1	25	3	25	550	750		C. G. E.
New 1	25	3	25	550	715		Lanc.
New 1	15	3	25	550	1450		Westg.
" 1	15	3	25	550	750		Lincoln
" 3	15	3	25	550	720		Westg.
New 2	13	3	25	550	700		Lanc.
Used 1	7 1/2	3	25	220	1500		Tor & Hm.
" 1	7 1/2	3	25	550	1450		C.G.E.
New 1	7 1/2	3	25	550	725		Westg.
Used 1	7 1/2	3	25	550	700		Lanc.
New 1	5	3	25	550	1440		Excelsior
Used 1	5	3	60	200	1120		Westg.
New 3	3	3	25	550	1500		Lanc.
" 4	3	3	25	550	1400		Westg.
" 4	3	3	25	550	1400		Excelsior
Used 1	2	1	60	110	1750		Wagner
New 2	2	3	25	550	1500		Lanc.
New 2	2	3	25	550	1440		Excelsior
" 2	2	3	25	550	1425		Lanc.
New 1	2	1	25	110	1400		Wagner
" 1	1 1/2	1	25	110	1420		Wagner
New 1	1	1	60	110	1725		Wagner
Used 1	1	3	25	220	1500		Tor & Hm
Used 1	1	1	25	110	1400		Wagner
New 1	1	1	25	110	1440		Wagner
" 1	1	3	25	550	1425		Lanc.
Used 1	1	3	25	220	710		C. G. E.

Write for Prices

H. W. PETRIE, Limited

131 Front St. West - - Toronto, Ont.

Can We Help You ?

There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

INFORMATION WANTED

Electrical News,
347 Adelaide St. West,
TORONTO.

Date.....19

Please tell me

.....

.....

Name

Address



Hole's Lighthouse

The Superior Luminous Pendant

*"Most Attractive in Daylight—
Most Brilliant at Night"*

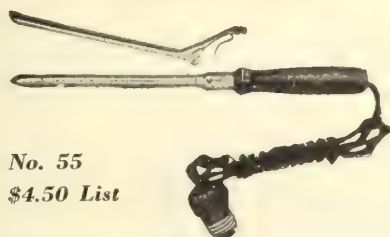
This article contains an actual quantity of real radium; is unbreakable and is guaranteed to retain its original luminosity for five years.

*Send now for your supply—They will sell!
Splendid display features and liberal discounts!*

Prices: To the dealer, \$1.80 per dozen mounted on attractive display card. \$21.00 per gross. Checks payable in American funds only. Cash with order 3% off.

HOLE'S LIGHTHOUSE, 6907 Jeffrey Ave., Chicago, Ill

"SERVICE"



No. 55

\$4.50 List

Combination Curling Iron and Waver Rod is a *good* iron. Your customers will want it. Guaranteed for one year.

LIBERAL DISCOUNTS

NORTHERN ELECTRIC COMPANY

542 St. Clair Street CHICAGO, ILLINOIS

LONGER LIFE AND HOTTER SPARK THAN FOUND IN OTHER BATTERIES



OUR GUARANTEE

Every battery bearing the North Star label is guaranteed to give full satisfaction to the consumer.

Should the battery prove defective, simply satisfy the merchant from whom purchased. He is authorized to replace it.

Sold by all leading jobbers.

CANADA DRY CELLS LIMITED Winnipeg, Canada

Contract Record and Engineering Review

349 Adelaide St. W. Toronto

A National Weekly for the
Construction Interests of Canada

Established 1885

Published Every Wednesday

\$3.00 a Year



The products marketed under this name are guaranteed to be standard in quality as well as in name.

This guarantee consists of over 39 years of specialized manufacturing experience in Canada and the United States and a successful service record of equal length.

STANDARD Products

include all kinds of bare and insulated electric wires and cables for all kinds of service, also cable terminals, junction boxes and other cable accessories. Write our nearest office about your wire requirements.

**Standard Underground Cable Co.
of Canada, Limited**

Hamilton, Ont.

Montreal

Toronto

Winnipeg

Seattle

WALPOLE ARMALAC

AND

Electrical Insulating Liquids and Compounds

WALPOLE products have been the recognized standard of efficient insulation for electrical apparatus since 1892.

WALPOLE products cover a complete line of Insulating Varnishes and Compounds meeting every requirement of the electrical industry.

Stocks carried by all reputable Electrical Jobbers.

Robertson Chemical Company
CLEVELAND, OHIO

Canadian Representative

H. B. HUTCHINGS, 14 Lincoln Ave, Montreal

ANNOUNCEMENT

The Province of Quebec Number of the "Electrical News", which was announced to appear June 15th last, was postponed on account of the printers' strike.

Operating on the open-shop principle, our plant is now sufficiently manned that we feel we can undertake the work on this important number. Accordingly it will be brought out September 15th - replacing the regular issue of that date.

The contents of this number will be of unusual interest to electrical men all over Canada and will be especially advantageous to advertisers.

Write for further information.



Just one of the many P.Q. plants which will be fully described.

Electrical
Engineering **News** Merchandising
Contracting Transportation

Hugh C. MacLean Publications

Toronto, 349 West Adelaide Street; Montreal, 119 Board of Trade Building

Motors in Stock

- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
 - 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
 - 1 10 hp. C.W. 750 rev., starter, rails, pulley.
 - 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
- 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 - 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 - 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 - 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
- 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
 - 1 16 hp. C. Wheeler 1800 rev., pulley, rails, starter.
- 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
- 3 ½ hp. 1200 rev. clutch type T.H.E.
 - 1 1 hp. 1800 rev. split phase Peerless.
- 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
- NEW SINGLE PHASE MOTORS in STOCK—REPULSION
- 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 - 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 - 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 - 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 - 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 - 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 - 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE
- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 - 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
 - 4 ¼ hp. Menominee 110 volt, 25 cycle, 1500 rev.

Toronto and Hamilton Electric Co., Limited

HAMILTON

ONTARIO

The World's Best Known Construction Tools

Over three-fourths of the telephone and telegraph lines in America have been built with Oshkosh tools.

OSHKOSH

CONSTRUCTION TOOLS

—for over 40 years the choice of big buyers and good workmen. Produced from the finest wood, iron and steel, in a plant complete with modern equipment, each tool must be so good that it will pass a series of three rigid inspections.

No wonder more Oshkosh Construction Tools are sold than all other makes combined!

Ask your jobber

OSHKOSH MFG. CO

916 Letric Street

OSHKOSH, WIS.



SAFETY FROST

Non-injurious to the skin, non-inflammable and absolutely permanent.

Easy to apply—Simply dip into can and allow excess to drip back for two minutes, and wash off with water.

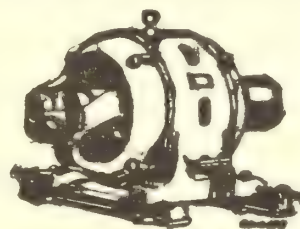
Is not affected by weather or heat of lamp. It is on to stay.

ARTS ELECTRICAL CO.

Makers
TROY, N. Y.

Carried in Stock by

W. H. Hazlitt & Co., Ltd., Vancouver, B.C.
International Machinery & Supply Co., Ltd.,
421 St. James St., Montreal



Motors Generators Transformers

Whether you want a single, a two or a three phase or a D.C. motor of any size, it can be found in our stock.

Here you will find new and re-built Motors, Generators and Transformers offered for sale or exchange from the largest stock of its kind in Canada.

You will make no mistake when you let us fill your Electrical Power Apparatus requirements. Our guarantee protects you. Our policy has always been low prices and a square deal to all.

Wire, 'phone or write us for particulars.

Electric Motor & Machinery Company, Limited

64 Wellington St.,
Toronto, Ont.

417 St. James St.,
Montreal, Que.

Has Outlasted 12 Sets of Ordinary Brushes

A big argument in favor of any commodity is its ability to last a long time.

NO-SPARK CARBON BRUSHES

These brushes are economical because they wear longer—we know of instances where they have outlasted 12 sets of ordinary brushes.

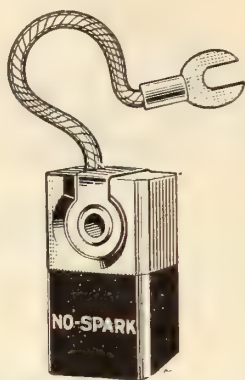
No-Spark Brushes are frictionless, do not chip or split, and give a no-spark commutation.

Send for our interesting bulletins.

CALEBAUGH Self-Lubricating Carbon Co.

1503 Columbia Ave., PHILADELPHIA, PA.

Canadian Representatives: Electrical Equipment Company, Limited, Montreal, Canada.



American Fibre Conduit Corporation

Successors to
American Conduit Company
Manufacturers of



"AMERICAN" FIBRE CONDUIT

FOR

Underground Electric Systems
is of Homogeneous Construction

light, strong and compact. It is made in two types of joint, the mortise and tenon, or Socket Joint, and tapered or "American" Harrington Joint, with Bends, Elbows and Fittings. It will stand the most rigid tests.

Large stocks—Immediate shipments.

Write for Booklet

General Sales Offices:
103 Park Ave. at 41st St.
New York, N.Y.

Chicago Office:
330 Monadnock Block.

FACTORY: FULTON, NEW YORK

LINCOLN ENGINEERS Cut Machinery Costs

A big item in the real cost of any machine is the cost of power to operate it day in and day out.

This item can be cut to its lowest point right in the beginning by purchasing a machine with the electric motor attached—a Lincoln Electric Motor—scientifically fitted to its job by Lincoln Engineers. Here are actual examples of the savings made by Canadian and U. S. machinery firms who are using Lincoln Motors.

Example No. 1—

A manufacturer of a small electric hoist now gets 25% greater capacity on the same machine with no changes whatever in design—simply by installing Lincoln Motors of the size and type recommended by Lincoln Engineers.

Example No. 2—

The leader in another line of hoisting machinery has adopted a Lincoln plan for simplifying both the electric motor and its control on his machines so that his customers get better results at less than half the former cost.

Example No. 3—

The largest manufacturer of a certain type of metal working machine is now using a 20 h.p. Lincoln Motor where he formerly used a 25 h.p. of another make. Further, his customers are paying about 50% less in power bills for the running of their machines.

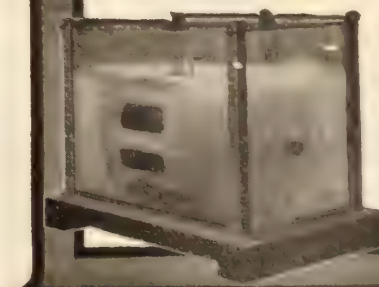
We are giving this same kind of service in Canada direct to motor users and motor driven machinery manufacturers.

Lincoln Electric Co. of Canada, Limited

Canadian Factory and Head Office
136 John St., TORONTO.

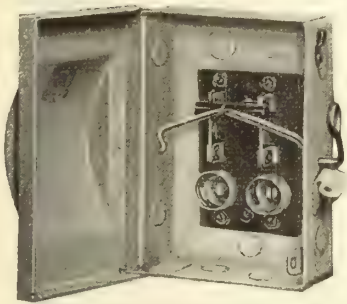
Link up with Lincoln
for
Performance & Service

Montreal Office
128 Coristine Bldg.



QUALITY ■ SERVICE ■ PRICE

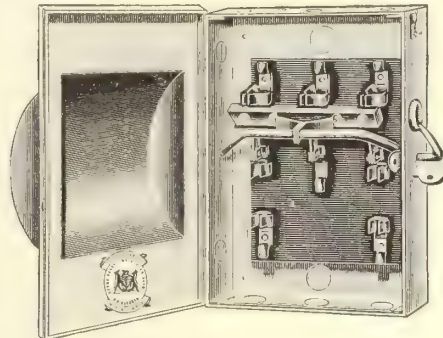
Mr. Electrician, How About These?



No. 1020

30A 125V. 2P.

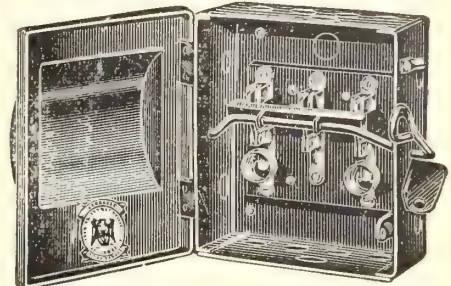
Non-breakable Composition Base. The Wireman's Friend



No. 2031N

60A. 125-250V. 3P.

Solid Neutral Quick-Brake Attachment on each Blade as known only on the Famous C. D. & E. B. Co. Product.



No. 1030N

30A. 125-250V. 3P.

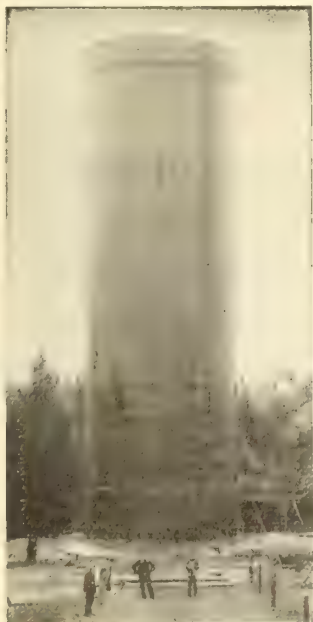
Solid Neutral Plug Fuse, absolutely the Neatest and Most Efficient on the Market.



Watch for us at the Exhibition



The Canadian Drill & Electric Box Co., Ltd.



COOLING TANKS

for transformer stations

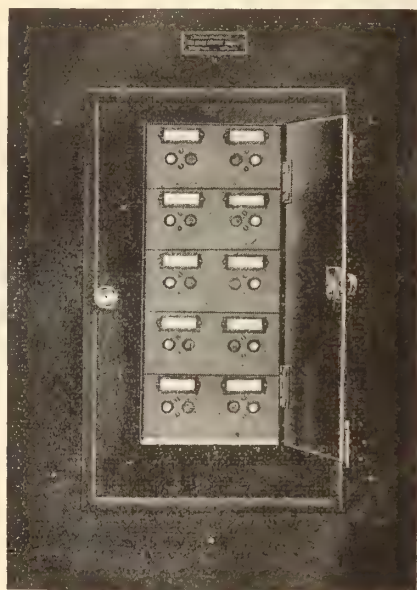
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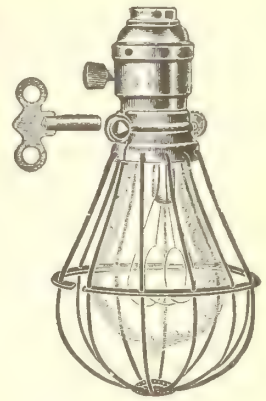
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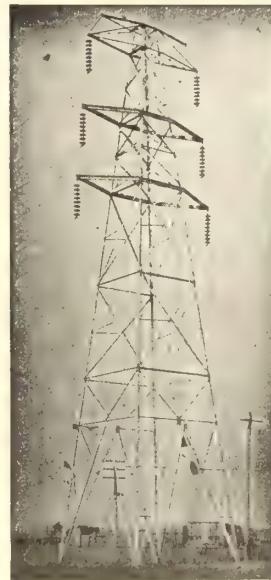
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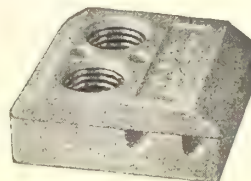
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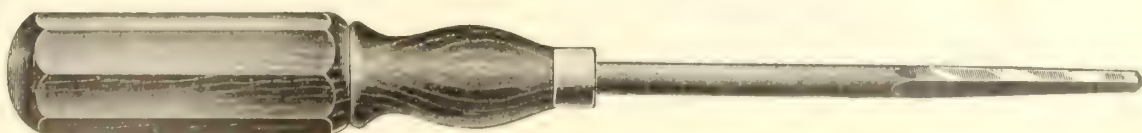
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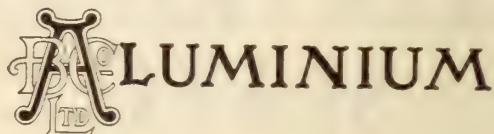
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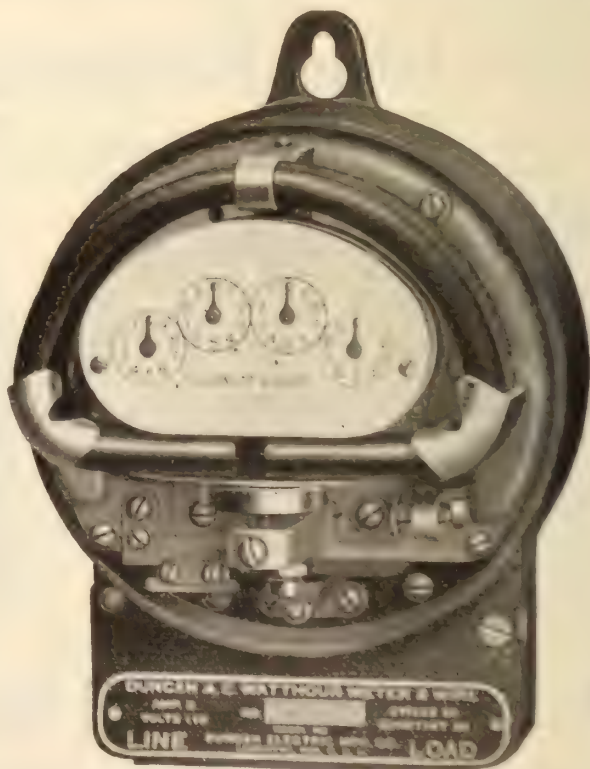
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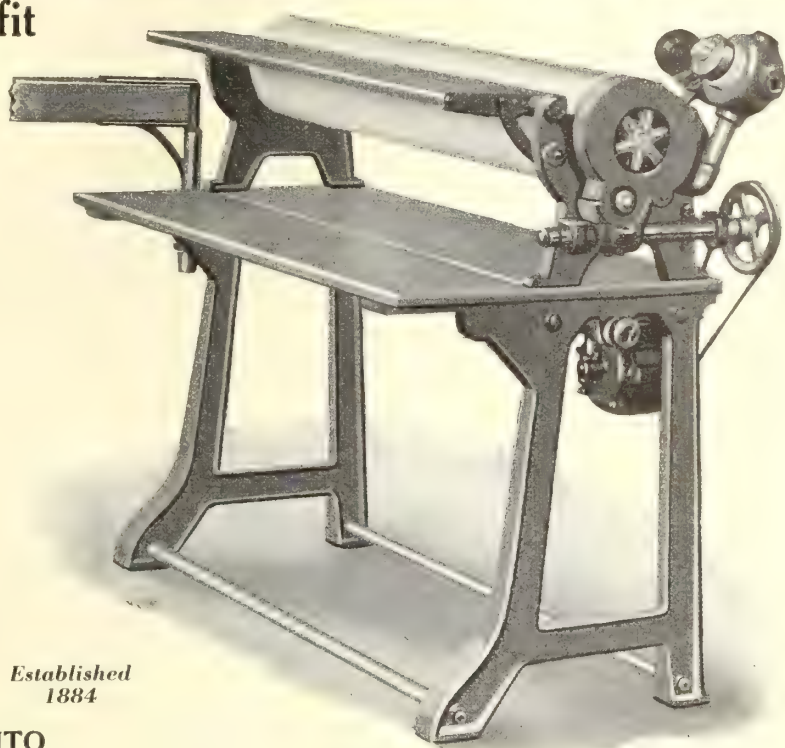
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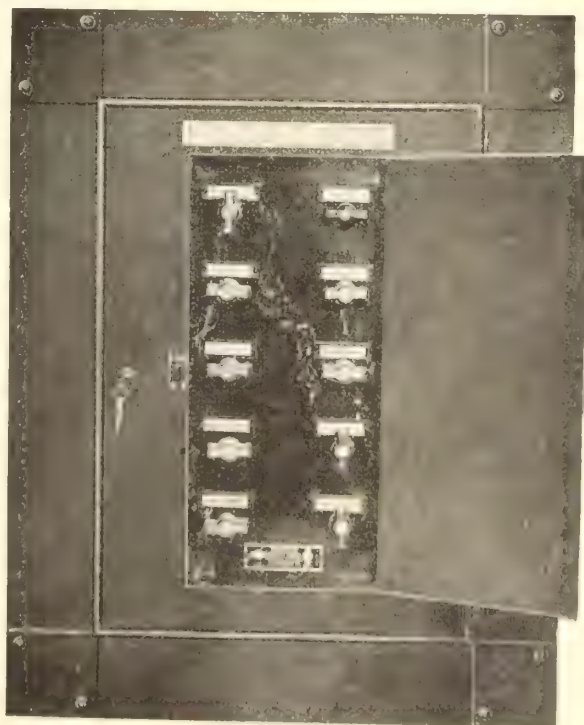


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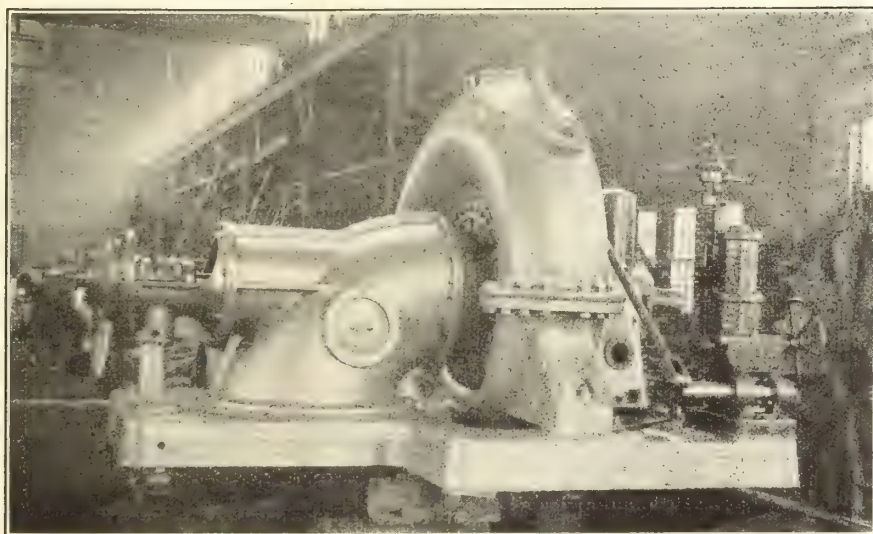
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*Manufacturers of High and Low
Tension Porcelain Insulators*

The Peirce Wireholder



No. 394

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If you appreciate

Quality Goods--Honest Values--Prompt Service

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For Value

5—1/6 H.P. 1 phase, 60 cycle, 1750 RPM. 110 volts, new each	30.00
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1—5 KW. Westinghouse generator, 1400 RPM. nearly new, 125 volts	175.00
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5—7 1/2 H.P. Westinghouse, 3 phase, 25 cycle, 710 RPM. 550 volt, base and starter, each	290.00
1—50 H.P. 3 phase, 60 cycle, 1800 RPM. 220 volts, or 550 volts, base and starter	700.00
1—35 H.P. 220 volts, 3 phase, 60 cycle, 1200 RPM. with starter	650.00
1—25 H.P. 3 phase, 220 volts, 25 cycle, 750 RPM. Crocker-Wheeler with steel base and pulleys and starter, almost new	625.00
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1—50 H.P. 3 phase, 25 cycle, 550 volts, 500 RPM., slipring motor, new	1100.00
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We also have oil and gasoline engines of all sizes.

We have some new 1, 2, 3 and 5 H.P. Westinghouse motors, never uncrated, at surprising prices.

Industrial Engineering Company of Canada, Limited
Consulting Engineers—Electrical Equipment

R. G. Lee, General Manager

TORONTO
28 Wellington St. W.

WINDSOR
Royal Bank Building

DAVIS SLATE
ELECTRICAL SLATE & MARBLE
DAVIS SLATE

SLATE

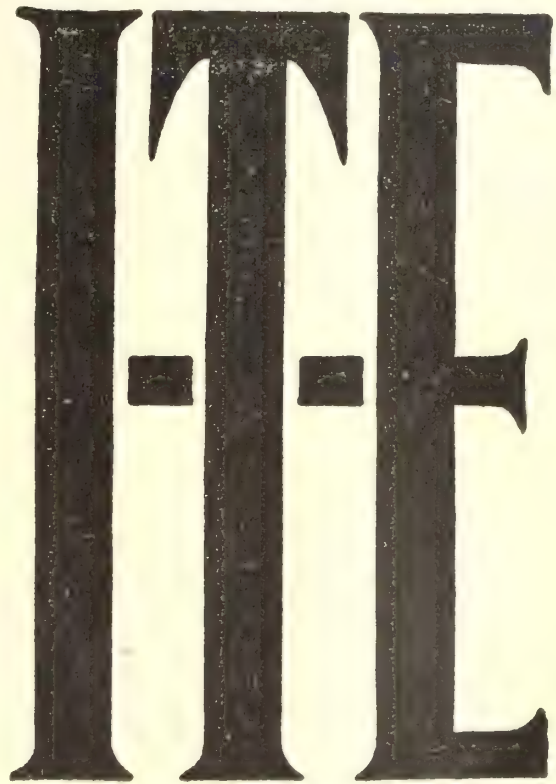
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Electrical Slate and Marble Producers

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Five Factories

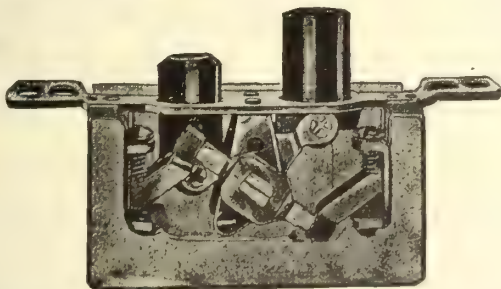
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BETTER AND CHEAPER THAN FUSES
THE CUTTER CO. PHILADELPHIA

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British Columbia Cedar Poles

They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices No obligation.

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Filer-Smith Machinery Company, Limited,
708 Confederation Life Building, Winnipeg, Man.

Irving Smith, 602 New Birks Building, Montreal.

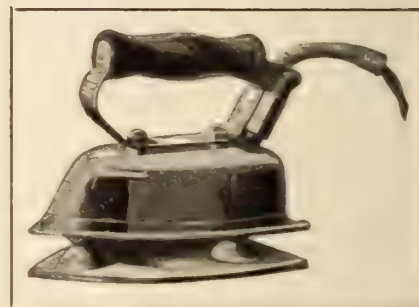
Two Popular Household Appliances

THE WESTINGHOUSE Type H ELECTRIC IRON

Possessing those rugged, lasting qualities that assure longer life.

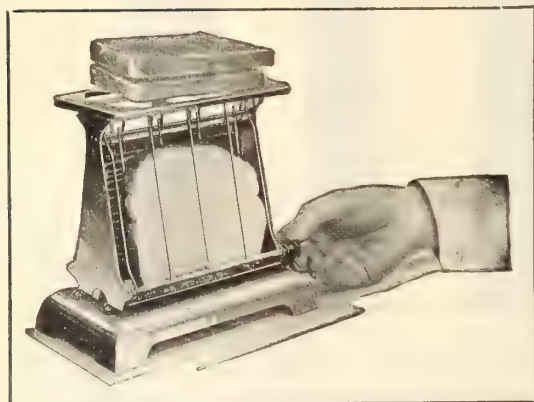
The heating element, the real measure of an electric iron, distributes the heat evenly over the whole base.

The metal sheath around the element holds the heat longer and makes the Type H Iron more economical.



Type H Iron

THE WESTINGHOUSE TURNOVER TOASTER



Turnover Toaster

As useful as it is attractive. It appeals to everyone who likes good, crisp toast. Every woman wants one as soon as she sees how easy the toast is turned with a twist of the knob without the slightest chance of burning her fingers, and she will tell her friends about it.

Other Westinghouse Electric Household Appliances equally useful are: Percolators, Toaster-Stoves, Table-Stoves, etc.

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FT. WILLIAM, Cuthbertson Block.
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VANCOUVER
1090 Mainland St.

MONTREAL—113 Dagenais St.
WINNIPEG—158 Portage Ave. E.

TORONTO—366 Adelaide St. W.
CALGARY—316 Third Ave. E.



A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

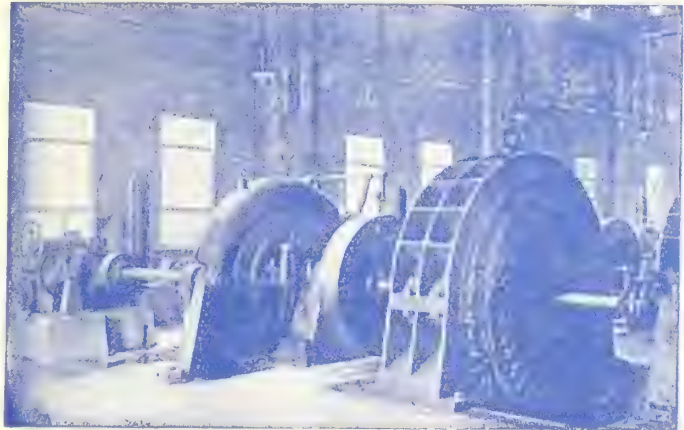
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

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Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

The Sign of Efficiency

MORSE DRIVES

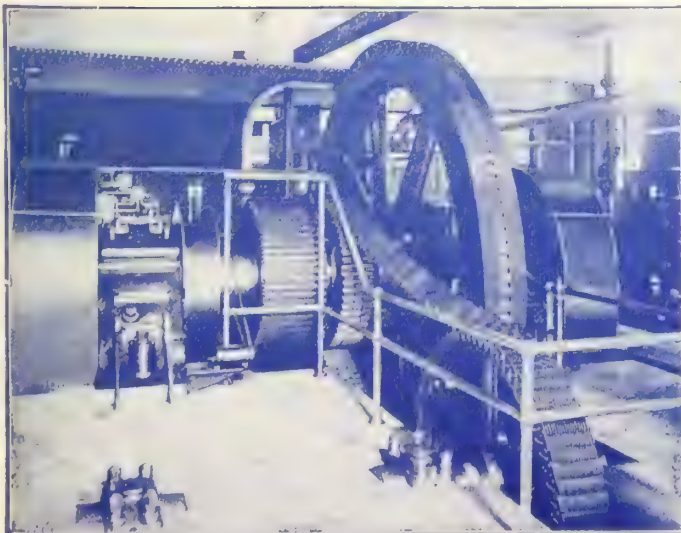
The Sign of Durability

Positive as Gears

THE MORSE "ROCKER JOINT"

Flexible as a Belt

Longer Life



1000 and 500 H. P. Morse Silent Chain Drives from Engine to Lineshaft.

Save power and space

Send us your transmission problems

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For perfect insulation, use BAKELITE - DILECTO, a practically waterproof material of unlimited qualities.

BAKELITE - DILECTO has extraordinary dielectric and tensile strength, is chemically insoluble when brought in contact with water or weak acids, is harder and stronger than most woods and will neither swell nor warp.

BAKELITE - DILECTO is hard and tough yet can be readily machined.

BAKELITE - DILECTO may be used in many places instead of rubber, mica and many other materials for insulating purposes.

We manufacture BAKELITE - DILECTO, Vulcanized Fibre and Continental - Bakelite in sheets, rods, tubes and special shapes; and Con-ite, a thin insulation in sheets or rolls from .005 in. to .020 in. thick.



Full particulars about Continental Insulating Products should be on file in your office. We will be glad to send literature "Insulation" on request.

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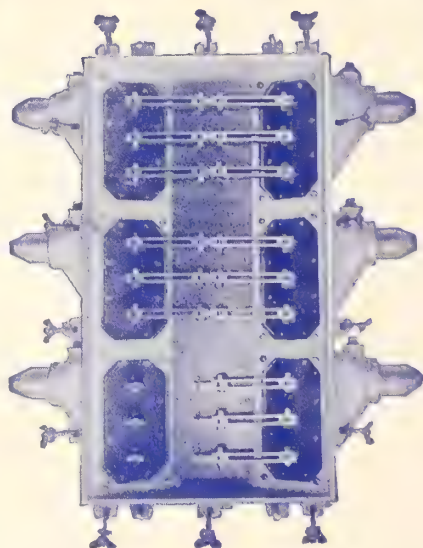
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HAVE YOU BENEFITTED?



Experience of the last few years has been very rich in its teaching of the value of flexibility in a distribution system.

Now that you have the opportunity to re-vise, balance, and rebuild circuits that were badly overloaded, why not guard against fixed limitations by using G & W POT-HEADS AND BOXES, which can be the basis of the greatest possible flexibility, both of operation and layout.

Build the flexibility in now.

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General Supplies, Limited, Calgary and Edmonton.



Electrical News

Engineering Contracting Merchandising Transportation



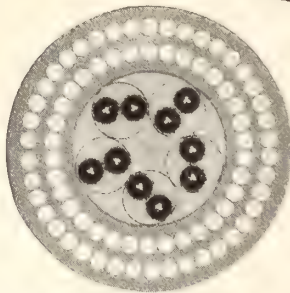
Northern Electric Company
LIMITED

Montreal Quebec Toronto London Regina Edmonton
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Province of Quebec Number



The Smoke Signal
The Primitive Communication
of the North American Indian



Submarine Telephone Cable

The cut above shows the cross-section of a Telephone Cable made for the Bell Telephone Company, and in use under the St. Lawrence river at Quebec. The No. 16 B. & S. conductors are formed of tinned copper strands and are insulated with a superior grade of rubber compound and taped. They are twisted into pairs which are in turn stranded together with jute to form a cylindrical core, the whole protected by two layers of steel wire armor.



Marine Cable

This is a type of cable specially designed for use in conjunction with our Marine Fittings on board ship, on piers or in any other place where the installation may be subjected to damp or harmful fumes. The cable is made up in single or multiple conductors and, in view of the service required, is protected by a lead sheath. This is the outer cover on some cables—on others extra mechanical protection is secured by means of a steel wire braid. Approved by Lloyd's and the Department of Naval Construction.

Largest Canadian Manufacturers of Bare and Insulated Wires and Cables

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LIMITED

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CANADIAN TURBINES

1867 - 1921



Ayers, Limited, Lachute Mills, Que.

Plant No. 1—Three 70" Stepless V. S. Canadian Turbines. Operating the Ayers' Industries and Supplying Light and Power to Lachute, Que.

Normal Speed-Discharge Turbines are an asset to all power developments: they are indispensable for low heads and varying water supply.

Orders Solicited on Merit Only.

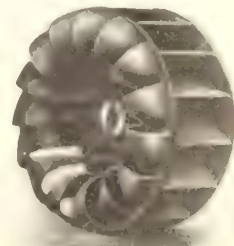
Your Most Profitable Investment.

CHAS. BARBER & SONS

MEAFORD, ONT.

Designers and Manufacturers

Write for Catalogue



We want you to know that:

The Canadian Triangle Conduit Company, Ltd., is a 100% Canadian concern. We operate a factory in Toronto and pay for rent, light, power, taxes, trucking, stationery, printing, etc., to Toronto concerns.

We buy our raw materials in the Canadian market.

We employ Canadian labor exclusively.

Every penny we dispense for the above purposes is spent in, and therefore to the benefit of Canada, for rents, food, clothing, etc.

The CANADIAN TRIANGLE CONDUIT COMPANY, LIMITED, therefore feel that they are justified in asking the support of the Canadian Electrical trade and a share of their orders for "Triduct," "Tristeel" and "Tricable."

The Triangle Flexible Steel Armoured Conduit is a single strip product so constructed as to give the proper amount of flexibility, insure rapid handling, easy cutting, and does away with the reforming of cut ends when applying to boxes and fittings.

The Canadian Triangle Conduit Company, Ltd., produce the best material of their kinds, give instant service, and quote prices commensurate with production-cost and market conditions.

Why not co-operate with a Canadian institution ?

Selling Agents

CONDUITS COMPANY LIMITED

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- - -

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"Totally Enclosed"



*Canadian Crocker-Wheeler 1/4 h.p., 110 Volts, 60 or 25 cycles,
totally enclosed motor*

"FOOL PROOF"

Superiority at all points is apparent in this Canadian Crocker-Wheeler 1/4 h.p. single phase motor. Being "totally enclosed" it is dirt and dust proof and sheds water like a mallard. The successful Crocker-Wheeler cast winding construction for the rotor is used. These features, together with its high starting and working torque, make it emphatically the motor for long and vigorous service in the hands of the inexperienced in connection with household appliances, etc.

Canadian Crocker-Wheeler apparatus and service are available
at all the N. E. Co. branches as follows:

Montreal, Halifax, Ottawa, Toronto, London, Winnipeg, Regina,
Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

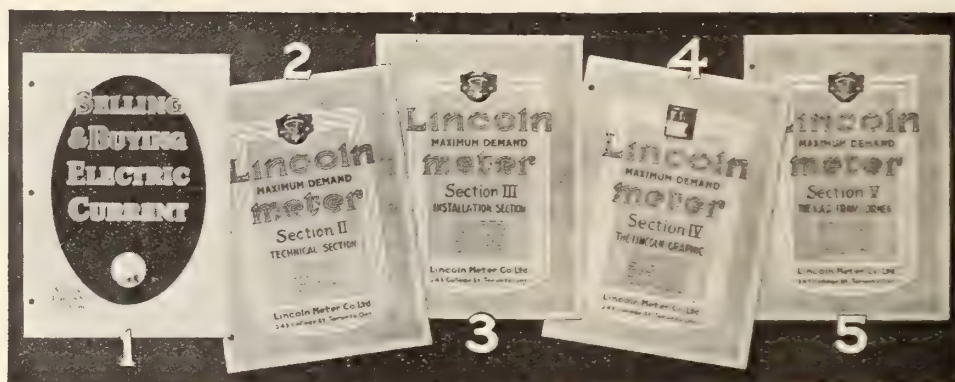
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Head Office and Works:

ST. CATHARINES, Ont.

District Offices:

TORONTO MONTREAL



Which Section of the Lincoln Catalog Shall We Send You

Just off the press—the Lincoln Demand Meter Catalog is ready to be sent to you. So that you can obtain just the information you want and so that you will **not** be required to read matter not interesting to you, this catalog has been published in five sections. Pick out which one you want, write for it, or for all five. You will be obligated in no way in reading these various discussions on rate making and why billing wholly on a measured basis means that you insure satisfaction for all concerned.

1. **SECTION I.—Commercial.** Subjects discussed: Non-technical, simple reasons for using the Lincoln Meter from a money standpoint, primarily; simplified study of rate making; how largest part of bills are now estimated; how Lincoln Meters put billing on measured basis; and what some users say.

2. **SECTION II.—Technical.** Subjects discussed: Technical reasons for use of the Lincoln, principle of operation, and how it measures, how it is made, how it is adjusted, the anti-vibration device, capacities, etc.

3. **SECTION III.—Installation.** Subjects discussed: Descriptive of mechanical parts, connection and dimension diagrams; testing diagrams and charts; transformer details; and ordering information.

4. **SECTION IV.—The Lincoln Graphic.** Subjects discussed: Similarity of Indicating and Graphic types; comparisons of two types of loads and reasons for the Lincoln Graphic; comparisons of various graphic meters; comparisons of actual charts; and description of meter.

5. **SECTION V.—The V A D Transformer.** Subjects discussed: Equitable distribution of fixed charges by the measurement of volt amperes rather than watts; phase shifting transformer, its design, construction and operation; vector diagrams of voltages involved in volt ampere demand measurement.



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

The Lincoln Meter Co., Limited

243 College Street, Toronto, Canada

Cable "Meters" Toronto Phone College 1374

Lincoln

MAXIMUM DEMAND

meter

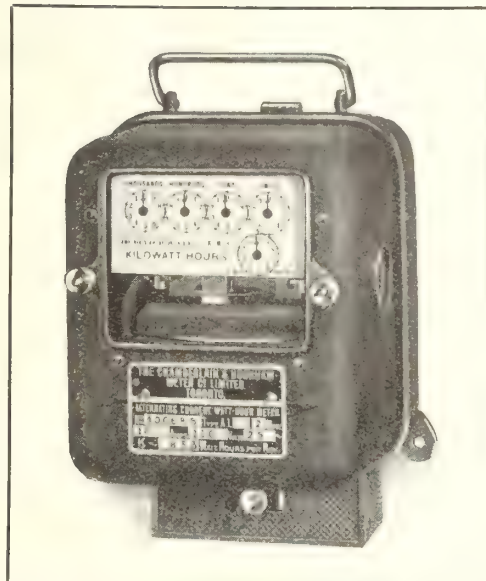


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.

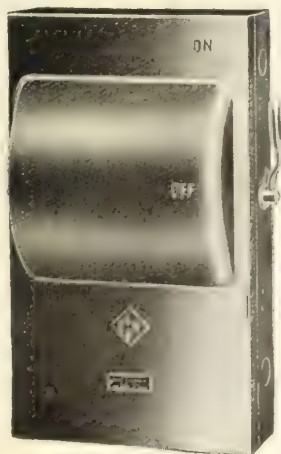


Chamberlain & Hookham Meter Co., Limited

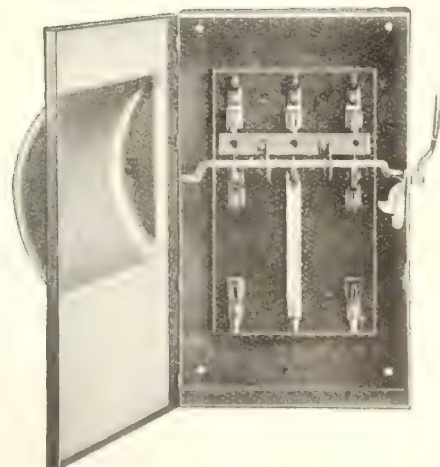
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Branches all over the World

Externally Operated Switches



Add Appearance
as well as Safety
to your job by
using



LANGLEY EXTERNALLY OPERATED SWITCHES

Write for Price List

Langley Electrical Manufacturing Co. Limited

WINNIPEG

MANITOBA

The Efficient and Dependable Service

in many of America's most notable Hydro-Electric Power Stations can be traced right back to the prime movers, consisting of

Smith Hydraulic Turbines

Recent Canadian installations and orders in course of construction include the following:

NEW BRUNSWICK ELECTRIC POWER COMMISSION

- 2—Units, 95 ft. head, 3670 H.P., each 300 R.P.M.
- 1—Unit, 117 ft. head, 3760 H.P., 300 R.P.M.

NOVA SCOTIA POWER COMMISSION

- 2—Units, 156 ft. head, 1960 H.P., each 514 R.P.M.
- 2—Units, 90 ft. head, 3450 H.P., each 300 R.P.M.
- 1—Unit, 24 ft. head, 820 H.P., 180 R.P.M.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

- 2—Units, 180 ft. head, 20,000 H.P., each 187 R.P.M.

PRICE BROTHERS, CHUTE DES GALETES PLANT

- 2—Units, 101 ft. head, 8820 H.P., each 189 R.P.M.

CHICOUTIMI PULP COMPANY, OULATCHOUAN FALLS PLANT

- 2—Units, 230 ft. head, 1800 H.P., each 250 R.P.M.
- 1—Unit, 230 ft. head, 1000 H.P., 720 R.P.M.

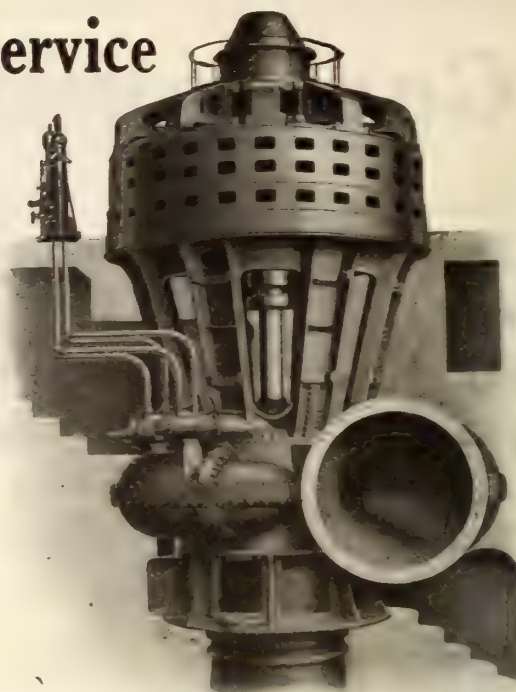
NORTHERN CANADA POWER COMPANY, WAWAITIN PLANT

- 2—Units, 122 ft. head, 4900 H.P., each 375 R.P.M.

SAGUENAY LIGHT & POWER COMPANY

- 3—Units, 53 ft. head, 2500 H.P., each 277 R.P.M.
- 1—Unit, 100 ft. head, 1300 H.P., 450 R.P.M.
- 1—Unit, 73 ft. head, 800 H.P., 400 R.P.M.

IF INTERESTED IN HYDRAULIC DEVELOPMENT, WRITE DEPARTMENT "N" FOR BULLETIN



Above illustration shows one of the six vertical shaft SMITH Turbines, with self-contained, direct-connected generator, in successful operation in "Volta" Plant of the Montana Power Co., where 90,000 H.P. is developed for operating the electric trains of the Chicago, Milwaukee & St. Paul Railway.



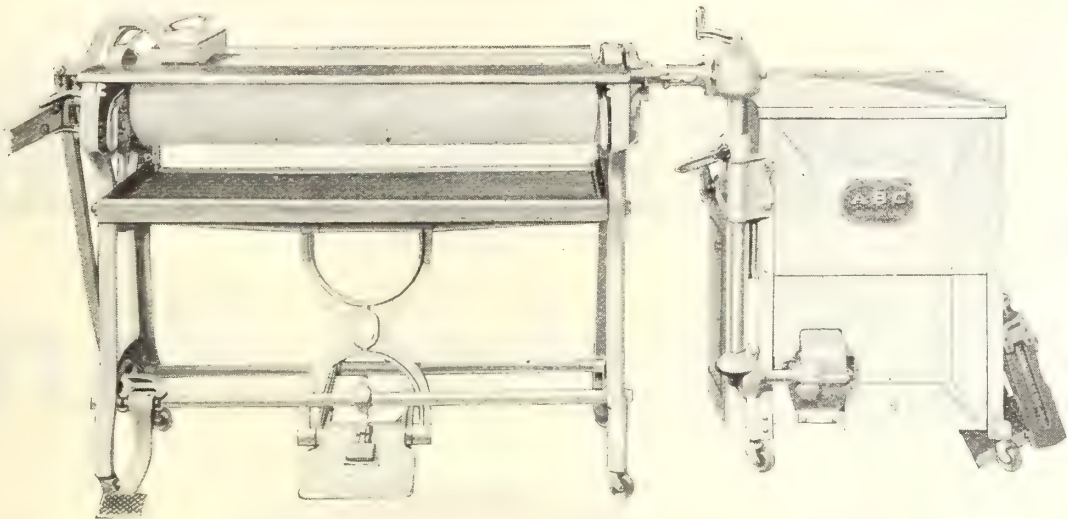
H. B. VanEvery,

Canadian Representative
405 Power Building, Montreal

S. Morgan Smith Co.

YORK, Pennsylvania, U.S.A.

*The
famous
A B C
Electric
Ironer*



*The
new
improved
1922
model
A B C*

A Home Laundry Team Without an Equal!

This A B C Electric Laundress unit that washes, wrings and irons, using the motor on the washer to operate the ironer and saving the purchaser the cost of an extra motor, has broken all sales records.

Although any model A B C washer—an “Alco” single tub, “Alco” double tub, Semi-cabinet (galvanized or copper tub) or Full Cabinet (galvanized or copper tub) washer—will drive the A B C ironer, the supreme combination is the ironer with the new A B C 1922 model No. 66, the “service-proof” washer.

There is nothing to compete with it. The A B C dealer has the field to himself with something different, something unusual, to capture business.

The A B C Ironer may also be sold separately, with motor, where another make of washer is in use.

Why don't you look into the A B C exclusive dealer proposition? The line is complete, with washers in every price class. The line is perfected—the result of 13 years' experience. The company behind the line is big, strong and in business to stay. The name A B C is well and favorably known. You receive real sales, advertising and service co-operation.

This A B C proposition has interested many of the highest class dealers in Canada. Certainly, then, it is also worth **your** consideration.

Write to-day for full particulars.

ALTORFER BROS. COMPANY, *Pioneer Makers of Power Washers and Ironers*
PEORIA, ILLINOIS, U. S. A.

C. D. HENDERSON, Canadian Representative, Box 123, BRANTFORD, ONT.

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A B C *Electric Laundress*
WASHES WRINGS IRONS

Westinghouse

TYPE
MH Electric Ranges



THE CLEANEST AND MOST DESIRABLE
RANGES ON THE MARKET TO-DAY

SOME DISTINCTIVE FEATURES:

All oven parts are removable by hand to permit thorough cleansing.

A heat shield over the main heating unit gives even distribution of heat throughout the oven.

When desired, a thermostat is provided with an adjustable pointer which can be set for any temperature desired. When the desired temperature is reached, electrical contacts in the thermostat close, ringing a bell, notifying the operator that the oven is ready for use.

Westinghouse For Better Cooking



Westinghouse Ranges have been in regular service in Canadian homes for a great many years, and to these homes they have brought the message of better cooking—cooking by electricity.

Catalogue 8-D-1 gives complete description.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
EDMONTON, 211 McLeod Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
CALGARY, Canada Life Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
VANCOUVER, Bank of Ottawa Bldg.

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Good light is as important as good air—the human body requires both, but if either one is bad, health and efficiency are impaired.

LIGHTING EQUIPMENT for small or large factories of all kinds,

Pulp and Paper Mills,
Textile Mills,
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Yards,
Etc.

Good lighting is not expensive. It pays for itself with saving effected by better and more work and less work spoiled, saving of time, and fewer accidents.

Read "The Big Profits from Good Light," which will be sent on application.

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BEAVERDUCT has been adopted by the Toronto Transportation Commission for use on their new street cars. Once again, quality has fittingly demonstrated its ability to withstand competition.

Beaverduct is "Made in Canada" in a modern plant under the supervision of the best engineers available. Beaverduct is produced under the underwriter's inspection. Its use on such an installation as the new Toronto Street Cars is a fitting testimonial of its superiority.



Good conduit can only be produced in a plant when the equipment permits only absolutely clean material being used. Electrical apparatus and plating solutions must be kept up to the mark under scientific management. The proper application of the enamel, after the galvanizing of the outside, is of vital importance. And, lastly rigid inspection.

*Always specify
"Beaverduct"*

Canadian General Electric Co., Limited

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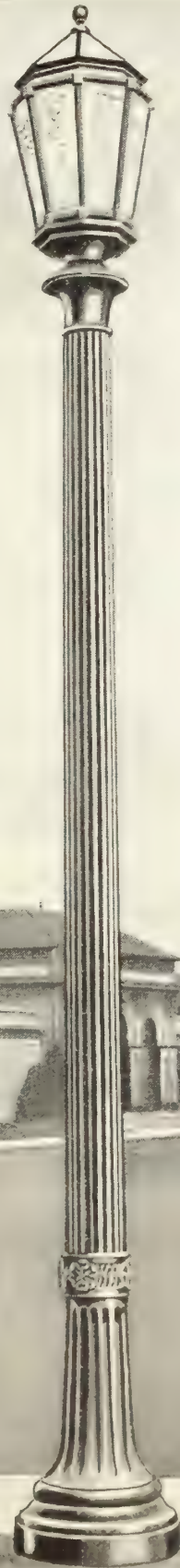
Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

**ORNAMENTAL
LIGHTING**
SUNNYSIDE BOULEVARD
TORONTO

CIVIC pride in the new Water-front Parkway demanded the best possible lighting system.

After exhaustive investigation, the Toronto Harbor Commission and the Toronto Hydro Electric System concurred in the adoption of C.G.E. Cast Bronze Lanterns, using 1,000 C. P., 20 ampere, Series Incandescent Mazda Lamps, fed through C.G.E. Series and Constant Current Transformers.

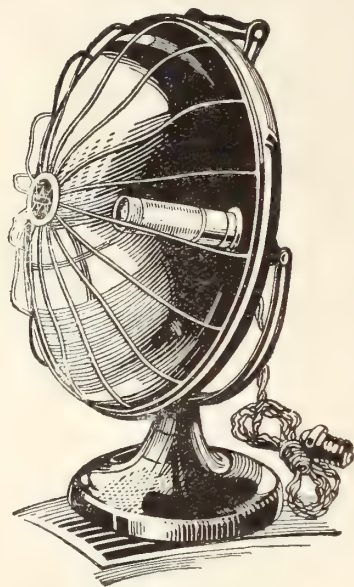
Our engineering experience in Street Lighting problems is at your disposal.



Canadian General Electric Co., Limited

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MADE IN CANADA

Profit Now with COZY GLOW Radiators

Cozy Glow answers the question that is coming up in every home, "How can we keep comfortable these cool nights before it is time to start the furnace?"

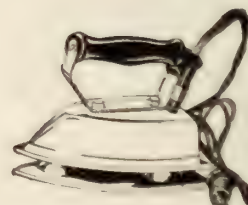
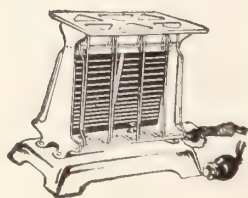
Home owners throughout Canada will see Cozy Glow advertised in the daily papers. They will want Cozy Glow because it means a real saving in coal and comfort besides.

The sale of a Cozy Glow means a satisfied customer, for the name Westinghouse is a guarantee of reliability and efficiency.

In past seasons the demand for Cozy Glow has always exceeded the supply.

Write us to-day.

Westinghouse



Two other Westinghouse household necessities that sell rapidly. Like all Westinghouse appliances, their beautiful and substantial appearance appeal at once to your customers.

Canadian Westinghouse Company, Limited, Hamilton, Ontario

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.

WE OWN AND OFFER
\$100,000
Laurentian Power Company,
LIMITED

(Incorporated under the Companies Act of the Province of Quebec)

6% First and Refunding Mortgage Sinking Fund Bonds

Dated January 1st, 1916.

Due January 1st, 1936.

Principal and Semi-Annual Interest (January and July 1st) payable at Imperial Bank of Canada, Montreal and New York.

DENOMINATIONS: \$100, \$500 and \$1,000

TRUSTEE Montreal Trust Company

Subject to Legal Opinion of E. R. PARKINS, K.C., Montreal

CAPITALIZATION

	Authorized	Issued
Common Stock	\$2,000,000	\$2,000,000
7% Cumulative Preferred Stock	350,000	350,000
6% Bonds due 1936	2,000,000	1,400,000

Of the \$1,400,000 Bonds outstanding, \$400,000 are held in escrow to retire a like amount of underlying 5% Bonds due 1931. The remaining Bonds in the Treasury can only be issued to the extent of 66 2/3% of the cost of additional capital expenditure, and then only if the net earnings for the preceding year are at least one and one-half times the interest on Bonds outstanding and to be issued.

We summarize the following important features:

The Company owns a water power in fee simple at Seven Falls, on the St. Anne River (the original grant for this power was made January 15, 1636) 35 miles from the City of Quebec, developed under a 410-foot head, with an installed capacity of 18,000 H.P., consisting of three units of 6,000 H.P. each, and the turbine for the fourth unit of the same capacity. (The generators and transformers for this unit will be installed when required, and when installed will then give a total capacity of 24,000 H.P.)

The Company has a 25-mile high-tension transmission line of 50,000 volts on galvanized steel towers set in concrete, from the plant at Seven Falls to Montmorency.

The Company has a contract with the Quebec Railway, Light & Power Company for 10,000 H.P. till September 1st, 1940. This power is delivered to the Quebec Railway, Light & Power Co. at Montmorency on the high voltage side of the step-down transformers.

The net earnings from this contract alone, according to the report of Messrs. Clarkson, Gordon & Dilworth, for the year 1921, were \$172,987.24, or over **twice the interest charges** after operating expenses and maintenance.

The replacement value of this property has been estimated by Mr. J. M. Robertson, engineer, at \$2,400,000, or \$1,000,000 more than the outstanding Bonds.

The Quebec Streams Commission have built one storage dam at Lac Brule, on the St. Anne River, and negotiations are in progress for the building of two more storage dams, which will materially increase the minimum flow of the river.

The report on the property by Mr. J. M. Robertson, of J. M. Robertson, Ltd., together with the auditor's report, are on file at our office.

These Bonds may be purchased for cash or on our Partial Payment Plan.

We Recommend these Bonds for Investment.

PRICE: 88½ AND ACCRUED INTEREST TO YIELD 7 1/4%

STERLING BOND CORPORATION
LIMITED

136 St. James Street - - MONTREAL

"Bonds of Sterling Merit."

HIGH EFFICIENCY Transformers

A
THOROUGHLY
CANADIAN
PRODUCT



RENDERS
UNFAILING
SERVICE



Single Phase
POWER TRANSFORMER

MOLONEY Transformers give a length of service not exceeded by any other make.

This service is due to their scientific design—which has been tested and approved by experts everywhere—and to the materials used and the care taken in their construction.

There is a Moloney Transformer for every purpose - their is one for yours.

Get it, and you will get supreme satisfaction.



3 Phase
POWER TRANSFORMER

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District Offices

Montreal and Halifax

Factory

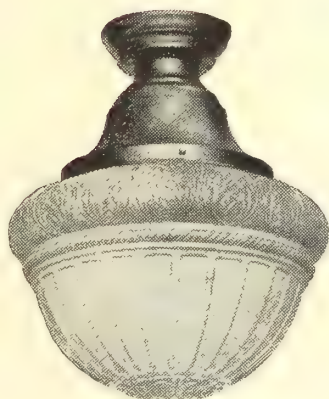
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**Supplies light and power
to 60 towns in the East-
ern Townships and Sur-
rounding Districts.**

**As industrial sites these
towns offer unsurpassed
advantages with ideal
labor conditions.**

**Our industrial depart-
ment will gladly furnish
full particulars and in-
formation to manufac-
turers who are looking
for new locations.**

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HALEBRO *Konec-tall* Plug

**A Better Plug That Fits all Makes
of Irons, Toasters, Heating
Appliances, Etc.**

Clips are made of selected Spring brass insuring perfect point of contact on all terminals. Spiral Spring gives absolute cord protection. Black composition parts are highly polished and heat resisting.

Every Konec-tall Plug bears our guarantee that it will give complete satisfaction. Also distributors of "Halebro" Flashlights, Bulbs and Messervey's No. 110 approved 2-way cluster.

Order from your jobber. List price 75c.

FLAT OR ROUND TERMINALS

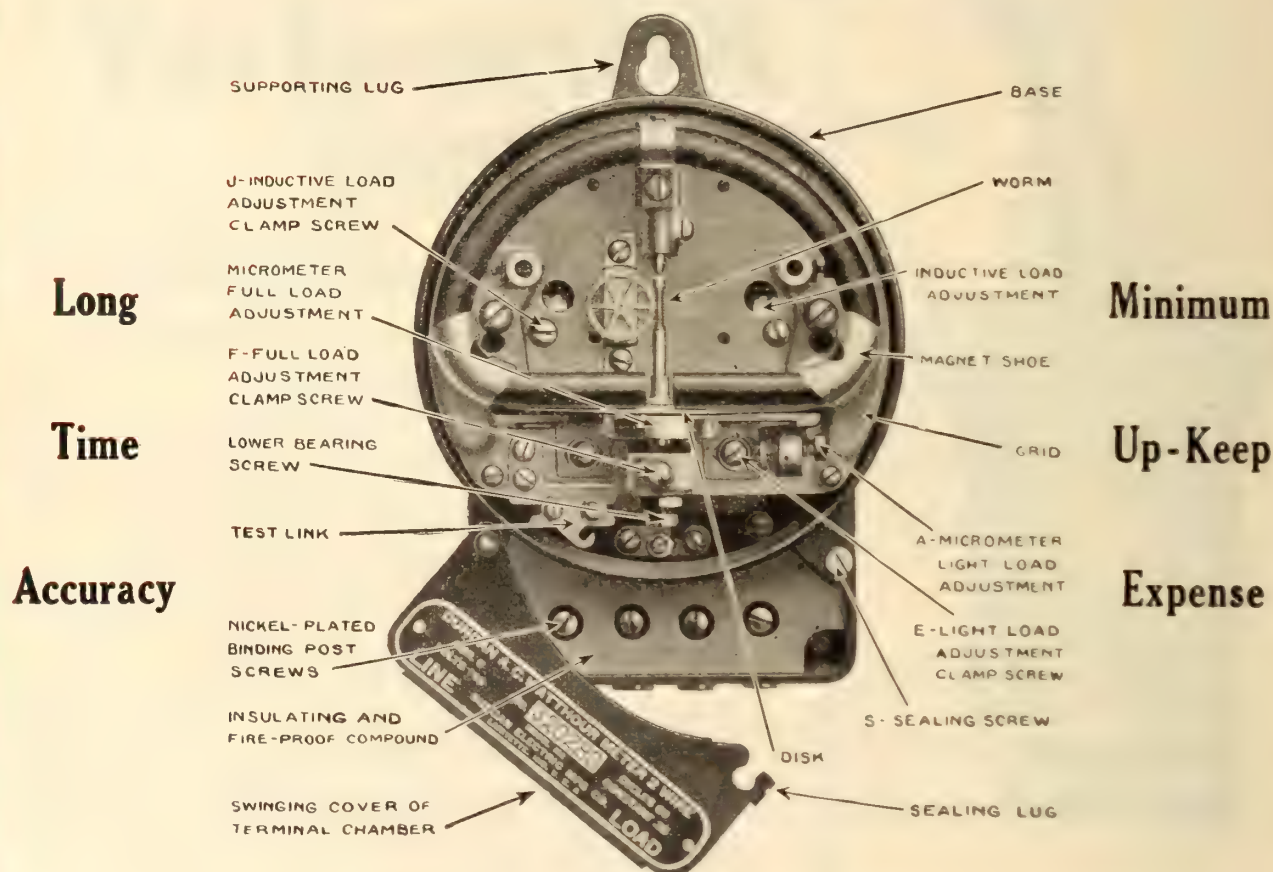
HALE BROTHERS

318 St. Paul Street West,

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Single and Polyphase



DUNCAN M2 A. C. METER
(Register Removed)

Light Moving Element,

Perfect Alignment of Parts

Accessibility

"BUILT IN" RELIABILITY

A good design is of great importance, but without skillful and careful manufacture the finest designs are worthless.

Write for Bulletin 110

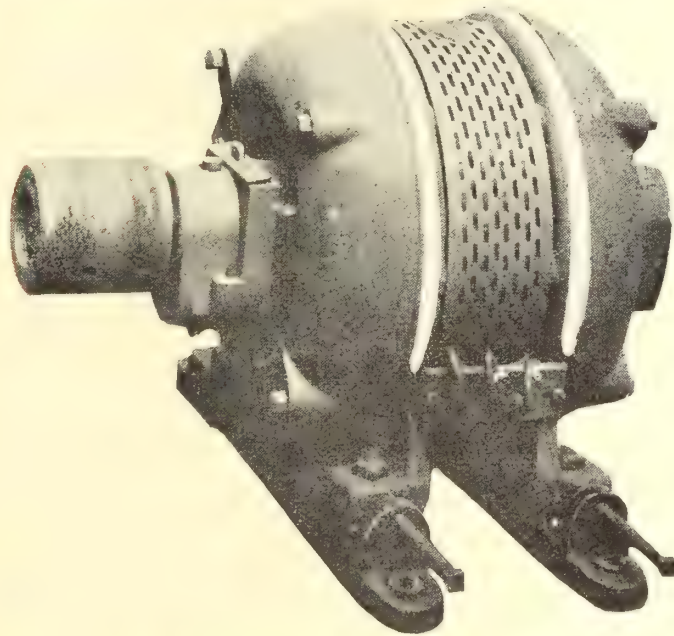
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"Let George Do It"

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"GOLD BAND"



Induction Motors

Manufacturing: from 1 to 10 Horse Power
Equipping: for 10 to 100
Horse Power

POWER UNITS

the kind that insure uninterrupted operation of machinery
MINIMUM REPAIRS - - - MAXIMUM SERVICE

Every "GOLD BAND" motor manufactured by us is thoroughly guaranteed to give dependable service. We also guarantee it to be the equal of anything imported, and when the duty and exchange rates are considered the wisdom of its purchase is easily recognized.

Spare parts are carried in stock ready to ship immediately upon receipt of order.

Bronze bearings, welded rotors, housings and bulleys.

If you have any motors, dynamos, transformers, etc., in need of repair, our 20 years' experience is at your disposal.

REMEMBER THE "GOLD BAND" SERVICE

Used motors of all sizes carried in stock

S.P. 60 Cy. 110 Volt

- 1 H.P. Wagner
- 1 H.P. Wagner
- 2 H.P. Wagner
- 2 H.P. Wagner
- 3 H.P. Wagner

For Immediate Delivery

3 P. 60 Cy. 550 Volt

- 5—5 H.P. different makes
- 3—7½ H.P. different makes
- 2—15 H.P. different makes
- 2—25 H.P. different makes
- 1—40 H.P. Lincoln

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Sole distributors province of Quebec for *The Big Four* :

A.B.C. Super Electric Laundress

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Alco Electric Washing Machines

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The best of material at fair prices with prompt and careful service

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Electric Power and Light

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Montreal Public Service Corporation

Reasonable Rates—Courteous and Prompt Attention—First Class Service

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Do not fail to visit

ST. ANNE DE BEAUPRÉ

AND

MONTMORENCY FALLS

Electric trains leave Quebec for St. Anne de Beaupré and Montmorency Falls from
St. Paul St. Station as follows :

FOR ST. ANNE DE BEAUPRÉ

Morning Service :

7.30, 9.30, 11.30 a.m.

Afternoon Service :

2.00, 4.15, 5.15, 5.45 or 6.15 p.m.

Fast Tourist Train with Guide leaves Quebec 9.45 a.m. and 2.15 p.m.

Beginning June 26th.

Half-hourly Service between Quebec and Montmorency Falls.

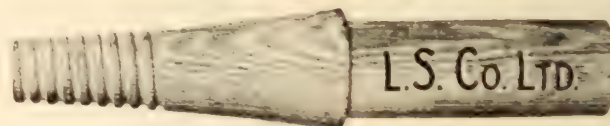
Top Pins, Side Brackets, Pole Steps and Cross Arms

MADE IN CANADA

*Highest
Quality
Only.*



Years ago our Pole Line materials built up a reputation for quality and strength. To-day they are always specified where efficiency is demanded and economy is measured by long and satisfactory service.



*On the
Best Jobs
from Coast
to Coast.*

As large manufacturers of these high quality materials, we have supplied Telephone, Telegraph and Electric Lighting Systems throughout Canada from Coast to Coast.



We Will Be Glad to Send Particulars and Prices to Interested Parties.

The Lachute Shuttle Co., Ltd.

LACHUTE MILLS, P.Q.

BUSINESS CHARACTER!

The character of any institution is reflected in its dealings with its customers and suppliers.

We feel that our rapid growth during the past 15 years is sufficient proof that the Electrical trade appreciate the

“Clean Cut Square Deal”

policy which is the outstanding feature of this house.
When you hook up with

“Electrical Equipment Service”

you are in touch with an organization in which every employee is out to assist in building a reputation for this organization that will reflect the ideals and ambitions of the management.

When in Montreal come in and get acquainted.

Electrical Equipment Company, Limited
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Power Transmission Lines,
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**Distributor
of**

All kinds of “MAZDA” Lamps

**Room 104
294 St. Catherine St. East**

MONTREAL

HYDRO-ELECTRIC DEVELOPMENTS

*At this time of high fuel costs, water power should displace fuel power
wherever it can be made available*

We offer a complete service in the development of hydro-electric properties, including a preliminary investigation and report, and the design and construction of the plant with equipment installed ready for operation. We also

construct from the plans of other engineers.

We shall be glad to discuss proposed hydro-electric work and explain our experience and how we can be of service.

DWIGHT P. ROBINSON & COMPANY

INCORPORATED

**ENGINEERS AND CONSTRUCTORS
NEW YORK**

With Which is Consolidated

WESTINGHOUSE, CHURCH, KERR & CO., Inc.

**DOMINION EXPRESS BUILDING
MONTREAL**

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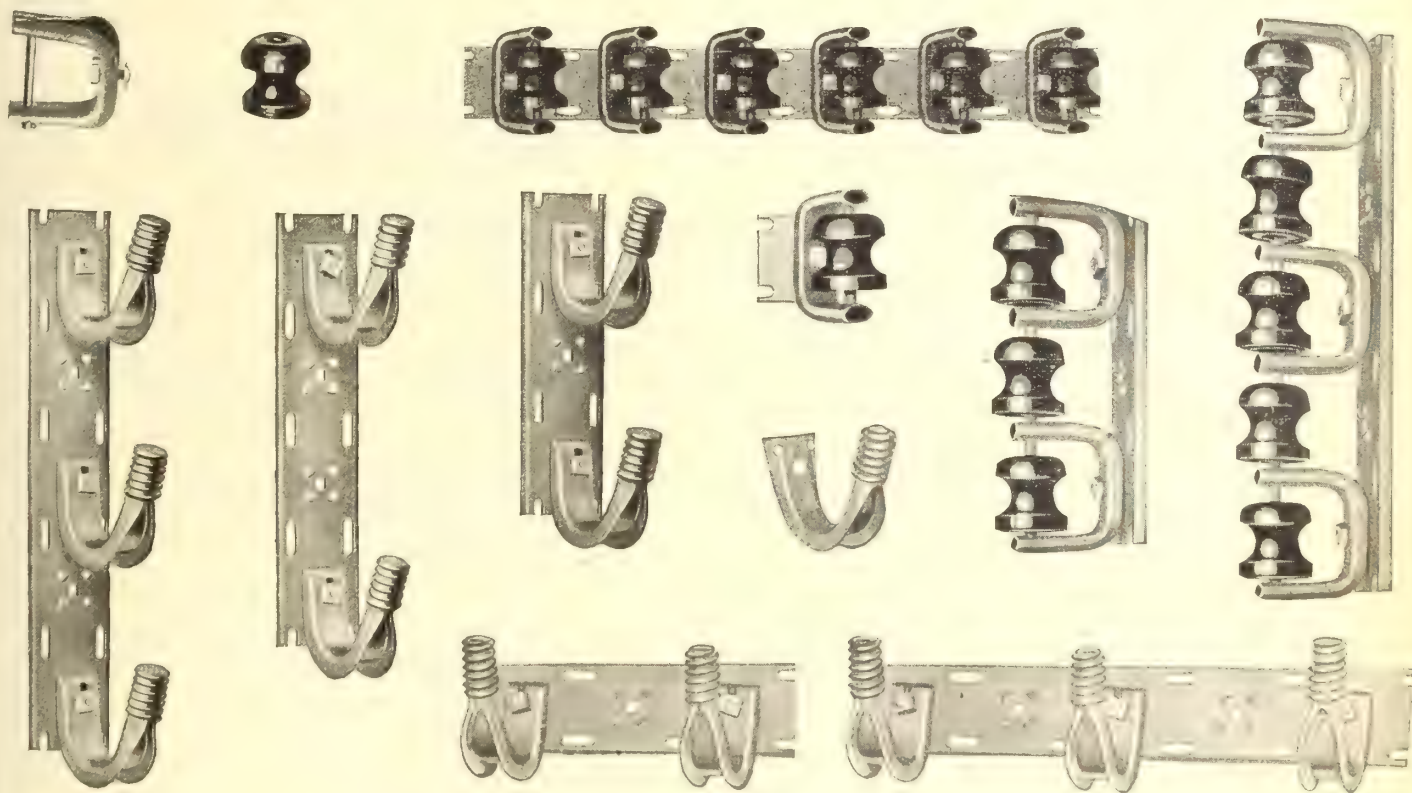
LOS ANGELES

Additional Bracket Service

WITH LOWER STOCK UPKEEP COSTS
BY USING

Universal Brackets and Racks

Pressed Steel—Hot Galvanized



YOU STOCK FOUR PARTS ONLY

{ A Back Strip
An Insulator Support
A Spool Holder
An Insulator

From this stock you can make quickly any of the above assemblies and many specials.

The thimble is a die cast alloy, ensuring uniformity. It is anchored to a resilient shaped support, which provides for expansion or contraction and pin hole variations.

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 2242 Rue St. Urbain

MONTREAL

 Directeur, Association des Entrepreneurs Electriciens de la
 Province de Quebec.

TEL. LASALLE 2437

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 413, RUE NICOLET
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 Reparations de Moteurs et
 Dynamos
 Installations de tous genres

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 Dynamo and Motor Repairs
 Installations of all
 kinds

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Practical Electrical Contractors

 Any kind of electrical in-
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 Atelier — 189 Ave. Bernard
 Phone St. Louis 505

 Magasin — 460 Rue Beaudry
 Phone Est. 8457

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Specialite Reparage De Moteur

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Electrical Contractors—Contracteurs Electriciens

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& Moteurs
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TELEPHONE ST. LOUIS 562J.

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115 Rue Bienville Montreal

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Office
Tel. Rock 4255

Residence
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MONTREAL

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Coin
Avenue du Park

TEL. CALUMET 128

J. A. St. Amour

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RIEN DE TROP PETIT**

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L. E. SIMONEAU

Practical Telephone Man

Twenty years' experience with the largest people.

I Specialize in Electricity applied to Clocks.

Manufacturer of Electrical Appliances.

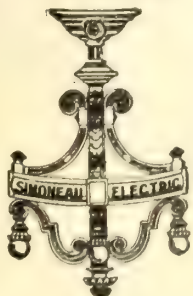
442 Richmond St. - MONTREAL

TEL. EST 2516

N. SIMONEAU

*Entrepreneur
Electricien et
Importateur*

411 Rue Amherst MONTREAL
En Face de l'Eglise Ste. Catherine.



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Fixtures électriques et fournitures de toutes sortes.
Estimés pour toute description d'installa-
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Reparages—22 années d'expérience

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Electrical Installations

Telephone Lines, Switch Board, Cable System, or inter-
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Repairs of all kinds. Work guaranteed. Estimates gladly
given. 29 years experience.

153 Laval Ave

Phone East 4118

MONTREAL

H. TRUCHON

Electrical Contractor

Supplies, Telephone and Line Work, Motors,
Dynamoes, etc., repaired—Estimates free.

PROMPT SERVICE A FEATURE

Telephone East 518 or East 3344

210 Plessis Street

MONTREAL

WM. ROCHON

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Cloches, Téléphones
Manufacturier d'Appareils
Electriques et à Gaz
Plaquage et Oxydage

**MOTEURS, LUMIERE
ELECTRIQUE, ETC.**

**ELECTRICAL
CONTRACTOR**

Bells, Telephones
Manufacturer of Electric
and Gas Fixtures
Plating of all Kinds

**MOTORS, ELECTRIC
LIGHTING, ETC.**

454 Parc Lafontaine, Montreal.

Tel., St-Louis 495



View of Completed Dam—Southern Canada Power Company, Drummondville



Arrow points to location of the Power House

QUEBEC OWES MUCH of her Industrial Progress To Electrical Development

THE development of water power in the Province of Quebec has made rapid strides within the past few years. In the increased use of the "white coal" which this Province is so fortunate in possessing, Concrete and reinforced Concrete Construction have played an important part—both as regards publicly-owned and privately-owned water rights.

CONCRETE HAS THE RESISTING QUALITIES SO ESSENTIAL FOR WATER POWER DEVELOPMENT

In no work undertaken by the engineering profession is the advantage of Concrete Construction more apparent than in the designing of those structures which must withstand severe strains such as that of dammed water.

It was well that Concrete was employed for the Dam of the Southern Canada Power Company at Drummondville, Quebec—for the ice broke up nine days before the completion of the work and unexpectedly flooded the dam. In spite of the sudden and unexpected strain thus imposed on the structure, it survived the ordeal without the slightest injury.

**CANADA CEMENT
CONCRETE
FOR PERMANENCE**

Our Service Department is anxious to co-operate in all lines of work for which Concrete is adapted. Our library is at your disposal at all times without charge.



CANADA CEMENT COMPANY LIMITED

Herald Building Montreal

Sales Offices Montreal Toronto Winnipeg Calgary

One Model 214 Washer Sells a Carload

A few weeks ago we shipped a carload of AUTOMATIC Washers to one of our Distributors. In it we included one of our New Model 214 COPPER TUB Electric Washers. Upon arrival of the car we received the following telegram:—

“Ship ONE CARLOAD of Model 214 IMMEDIATELY”

We believe the enthusiasm of this Distributor was brought about by the Neat and Compact appearance of the machine, its Simplicity and Durable Construction, and the new features it embodies. We believe it was because the highly polished 16-oz. corrugated COPPER TUB with its shining ALUMINUM LID attracts attention.

Because the **new method** of driving Dolly (from top of upright wringer drive shaft), eliminates the lever bracket on side of tub, the upright rocker arm and the rack bar. (There is NO strain on side of tub.)

Because every gear is completely enclosed. (What a favorable impression this “Safety First” principle will create.)

Because the oil cups insure **correct** and **convenient** lubrication of the bearings.

And because the substantially mounted Wringer with its 12-inch “power” rolls requires the use of **one hand only** to release and swing it over the handy Folding Bench for holding extra tub.

Judge of this Model 214 by These Quotations

“We Expect This Machine To Go Big.”

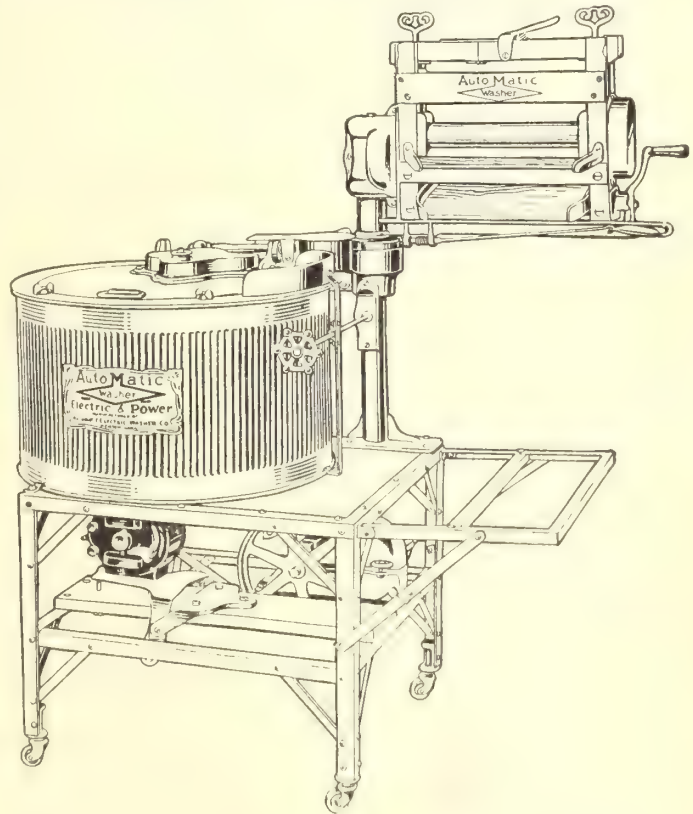
“We sold the Model 214 Fifteen Minutes After It Was Unpacked.”

“Believe we will sell a lot of the new type machine.” (This Dealer has ordered 10 in two weeks. Population 4700.)

“Our customers who have seen this New Model 214 were immediately enthusiastic about it, and expressed their appreciation, which **we think the machine justly merits.**” (Twelve of our Model 214 alone have been ordered by this Dealer. Population 7000.)

And as **your** organization and **their** organization are “two of a kind”—each having a good trade that knows a good thing when they see it—why wouldn’t our line of AUTOMATIC Washers increase sales and profits for you just as it is doing for them?

Write for JOBBER or DEALER AGENCY TO-DAY!



Automatic Electric Washer Company, Inc.

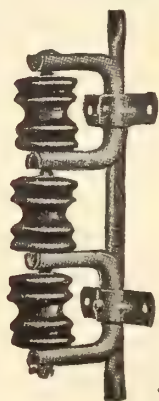
600 Third Street, Newton, Iowa, U. S. A.

N. Slater Co. Limited, Hamilton

Peirce Pole Line Hardware

"Built for Service"

LIGHT SECONDARY



For efficient and satisfactory service in all
classes of Pole Line Hardware

Peirce Brackets
ARE THE
Acme of Perfection

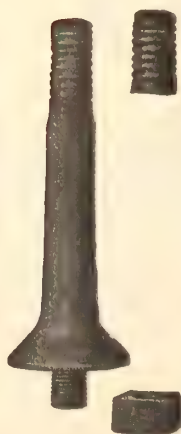
WIRE HOLDER



Our Electric Construction Specialties are made by experts—men who
who have gained their knowledge through years of practical experience
in the electrical field.

Peirce Brackets are known the world over, used by every Central Sta-
tion in Canada. A sufficient guarantee of its reliability.

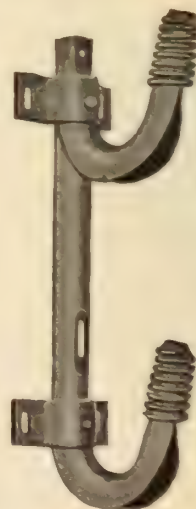
HI-TEN PINS



SERVICE — right
QUALITY — right
PRICES — right

Always pleased to quote prices

HOUSE SERVICE

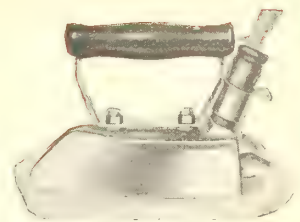
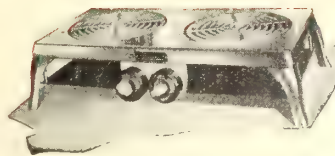
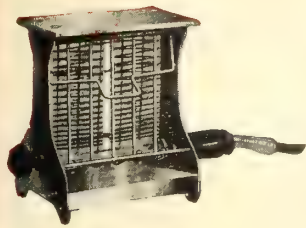


N. SLATER CO., LIMITED

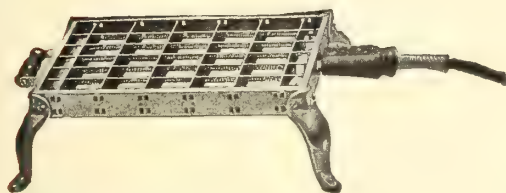
Acme Stamping and Tool Works Branch
HAMILTON — CANADA

Made in Canada under Peirce and Hubbard Patents.

"The Hardware MAKES the Line"



National **Products in the Home** ELECTRIC



**No Dirt
No Smoke
No Odor**

HERE is a field offering almost unlimited opportunities to the dealer. There is probably not a home in your district which could not use at least one of these articles. Remember the "National" lines embody the very finest materials and workmanship and are guaranteed to give every satisfaction. They are known and used from coast to coast and the reputation they have gained cannot fail to help the dealer and his business.

Every co-operation is given the dealer by us—booklets, pamphlets, newspaper illustrations and window cards being among the sales helps we distribute.

Watch papers for our coast to coast newspaper advertising campaign.

Do not try to sell something "just as good." Decide on the "National"—you cannot go wrong.

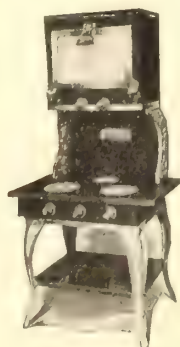
The National Electric Heating Co., Ltd.

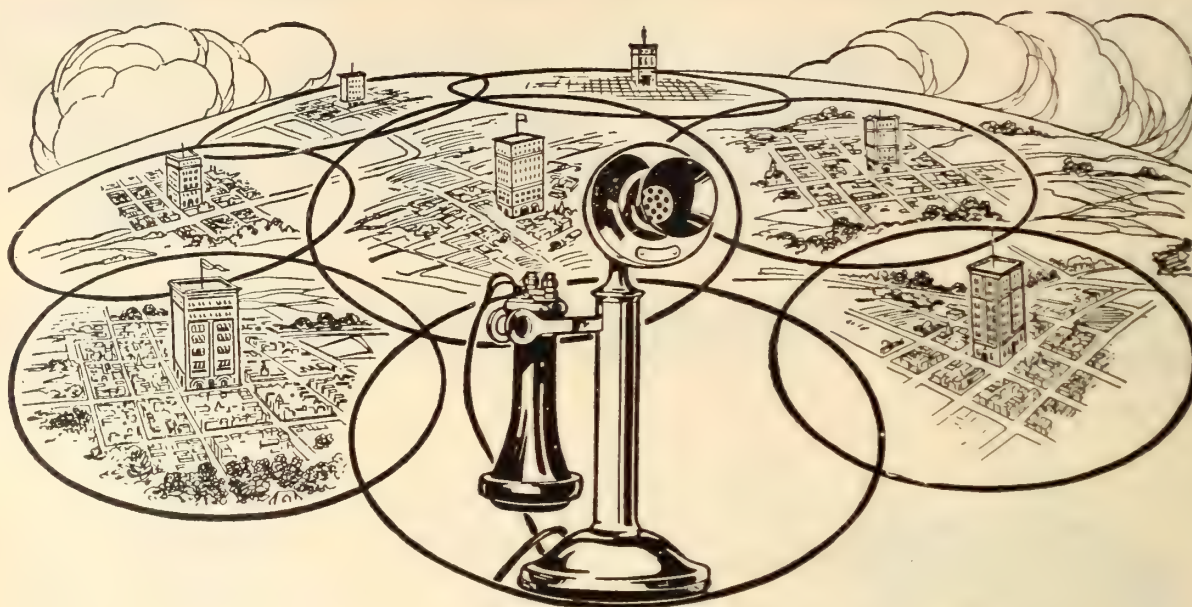
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Sales Offices:
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VANCOUVER
627 Vancouver Block





Continent-wide Talking Circles!

SCIENTIFIC research has brought about a constant succession of improvements and refinements of Long Distance Telephony!

With improvements in voice transmission has come public demand for longer and ever longer talks.

To meet this demand it has been necessary that not only our long lines should be constantly improved and extended, but the standards for exchange equipment—wire, cable, conduit, switchboards and subscribers' stations—have had to advance to keep pace.

Hence the modern telephone system is a complex organism wherein, to function properly, every separate part must be in proper relation and adjustment with every other.

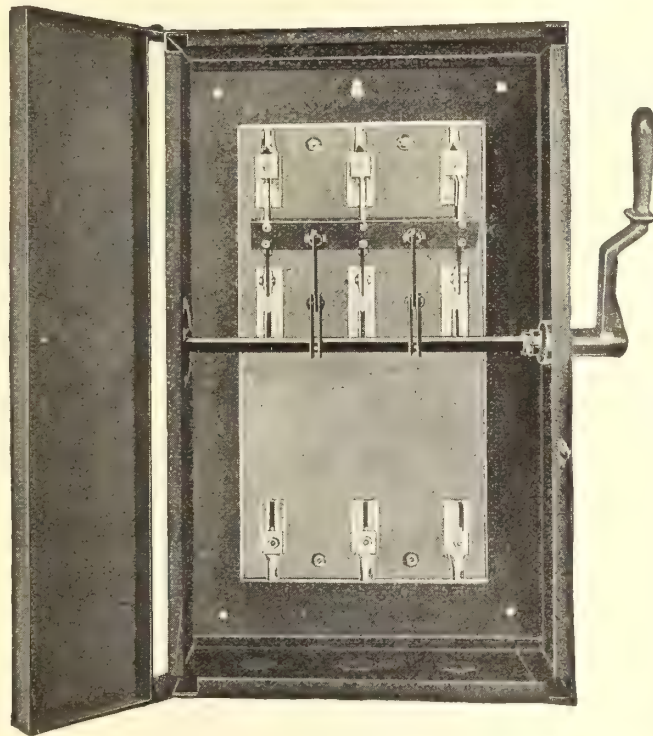
Recent Classifications of Long Distance Telephone service are along the same line as the mechanical advancements referred to above. They offer to the user the type of long distance service best adapted to the needs of his particular business. **We suggest that you study carefully the use of Station-to-Station service, so that, where possible, you may effect a saving in your long distance bills. Our Manager will be glad to give you the benefit of his experience in this regard.**

Every Bell Telephone is a Long Distance Station

**THE BELL TELEPHONE COMPANY
OF CANADA**



The Devoe Safety Switch



Stop Experimenting with Switches
DEVOE SAFETY SWITCHES

ARE GUARANTEED

They Combine Appearance and Long Service



The Devoe Electric Switch Co.

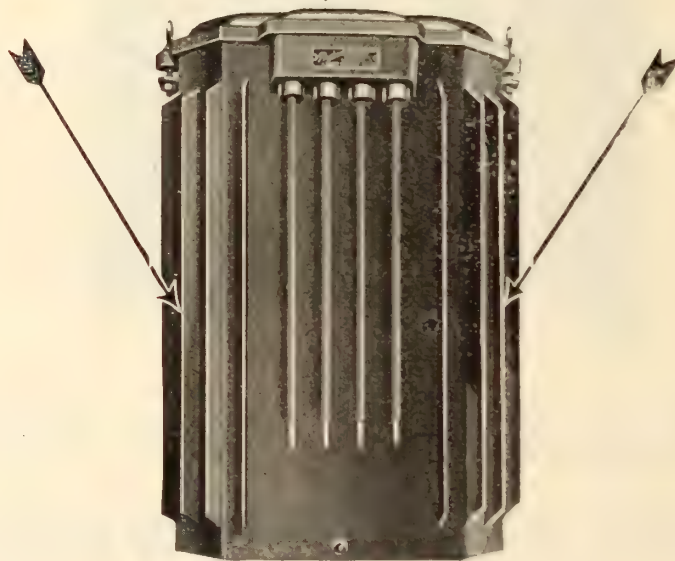
414 Notre Dame Street West, MONTREAL, Que.

105 Victoria Street, TORONTO, Ont.

Packard
TRANSFORMERS

Here they are!

Heat Dissipators, a new exclusive feature of
Packard Welded Steel Cases



The advantages are these—smaller Transformer, less weight, lower temperature rise, and greater overload capacity.

Prompt delivery of all standard sizes from stock. Special units supplied at short notice.

Get in touch with our nearest agent now.

Others may follow, but we lead.

The Packard Electric Co., Limited
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401 Temple Building, Toronto

421 Power Building, Montreal

Confederation Life Building, Winnipeg

Agents:

Eastern Electric Co., Limited, St. John, N.B.

J. T. Warren, 738-11th St. West, Calgary, Alta.

W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.



MONARCH POWER APPARATUS

It will interest and repay you to ask us for information and quotations on the following apparatus of our manufacture

**Oil Circuit Breakers
Load Air Break Switches
Disconnecting Switches
Choke Coils
Lightning Arresters
Fork Service Insulators
Cable Clamps
Current and Potential Transformers
Bus Bar Supports and Clamps
Switchboard Accessories
Power and Lighting Switchboards**

Canadian Central Stations can serve their own interest and make the Canadian Dollar worth any hundred cents by buying

Monarch all Canadian Made Power Equipment

**MONARCH ELECTRIC COMPANY, LIMITED
ST. LAMBERT, District of MONTREAL**

CITY OF QUEBEC

PROVINCE OF QUEBEC

What Quebec Has in 1921

Population	116,850
Population of tributary territory	155,000
Total value of assessable property	\$114,327,947 00
Total assets	14,265,534 12
City's debt	15,164,177 00
City's area	5,820 ac.
Miles of street	96.4
Miles of sewers	90
Miles of cement walk	35
Miles of water mains	128
Miles of permanent pavements	24.5
Miles of macadam pavements	40
Number of Houses	10,100
Number of Tenements	23,000
Number of Industries	450
Number of Employees	14,500
Steam Railways	9
Steamship, all ocean and inland lines	-----
Electric Railway (suburban)	1
Street Railway	1
Mileage of Street Railway	26
Banks and Branches	46
Number of Churches	42
Number of Hospitals	19
Public Parks	9
Number of Public Schools	66
Number of Private Schools and Business Colleges	19
University	1
Technical School	1
Collegiate Institutes	3
Enrollment at School	18,381
Number of Police Officers	131
Number of Firemen	174
Daily Newspapers	5
Number of Theatres	9
Number of Hotels	17

THE GROWTH OF THE CITY

Population

In 1901	68,840
In 1911	78,710
In 1921	116,850

Assessments

Total value of assessable property in 1901	\$26,397,309 00
Total value of assessable property in 1911	63,103,510 00
Total value of assessable property in 1921	114,327,947 00

Building Permits

Issued in 1910	\$526,498 00
Issued in 1915	2,576,342 00
Issued in 1920	2,301,480 00

PORT STATISTICS

YEAR	EXPORTS	IMPORTS
1916	\$3,991,861	\$11,945,964
1917	15,212,135	16,898,120
1918	13,331,114	15,571,742
1919	9,650,803	19,360,110
1920	22,464,945	19,951,075

BANK CLEARINGS

1916	\$192,163,703 00
1917	213,505,336 00
1918	238,906,890 00
1919	290,938,483 00
1920	364,589,361 00

INDUSTRIES

Census of 1900

Number of establishments	255
Capital invested	\$9,588,739 00
Employees on salary and wages	9,384
Salaries and wages paid	\$3,103,578 00
Cost of raw material	7,127,494 00
Value of products	12,779,546 00

Census of 1910

Number of establishments	175
Capital invested	\$16,488,303 00
Employees on salary and wages	8,067
Salaries and wages paid	\$3,632,199 00
Cost of raw material	8,212,505 00
Value of products	18,933,227 00

Census of 1918

Number of establishments	424
Capital invested	\$36,927,434 00
Employees on salary and wages	11,500
Salaries and wages paid	\$6,979,516 00
Cost of raw material	16,067,679 00
Value of finished products	38,265,277 00

QUEBEC OFFERS TO MANUFACTURERS

Plenty of fine industrial sites, alongside of the nine railway lines entering the city, and also six miles of deep water frontage.

The finest transport facilities in the Dominion (rail or water).

Plenty of skilled and unskilled labor.

Any amount of electrical power at reasonable rates.

Quebec has also exceptional opportunities for new industries.

For any further information apply to

THE INDUSTRIAL COMMISSIONER.

Board of Trade Building,

Quebec, Canada



What the City of Ottawa Offers Industrial Concerns

OTTAWA -- Canada's capital and the industrial and commercial centre of eastern Ontario at once appeals to the growing industrial concern in search of new locations.

POWER AND LIGHT

First among Ottawa's offerings is the abundance of cheap power and light. Within a radius of 45 miles there is available 1,000,000 hydraulic H.P. low water estimate. Of this 230,000 H.P. is available within 10 miles of the City Hall. Rates for both power and light are the lowest on the continent.

TRANSPORTATION

In addition to the easy access by water there are also 9 steam railways entering the city. In this respect Ottawa is from one-half to two days nearer Western points than any other industrial centre of Ontario. Four express companies are located within the city.

SITES

Ottawa, the city of opportunity, the city of cheap water power and lots of it, the city ideally located with regard to rail and water hauls, the city where the product of the industrial establishment can travel along

National routes speedily with a decided advantage in time of haul and freight charges over all Ontario and Western cities,—has wisely considered the needs and requirements of the investor and manufacturer, and offers attractive inducements to same. Splendid industrial sites with tracks ideally located have been conserved and are now available at lucrative rates. Within the city, there are available sites awaiting occupancy at a nominal cost.

INFORMATION

Application to the Industrial and Publicity Commission will immediately bring full details concerning these. Why not write to-day?

INDUSTRIAL AND PUBLICITY COMMISSION

H. K. Carruthers, Secretary

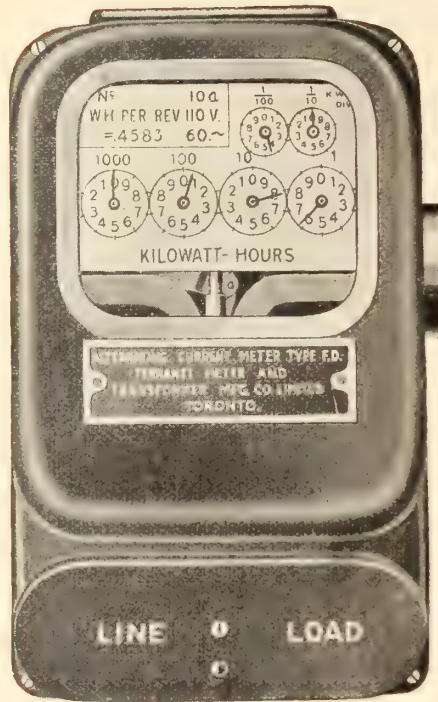
OTTAWA

CANADA



SPECIFY FERRANTI

For Long and Reliable Service



Scale $\frac{1}{2}$ Size

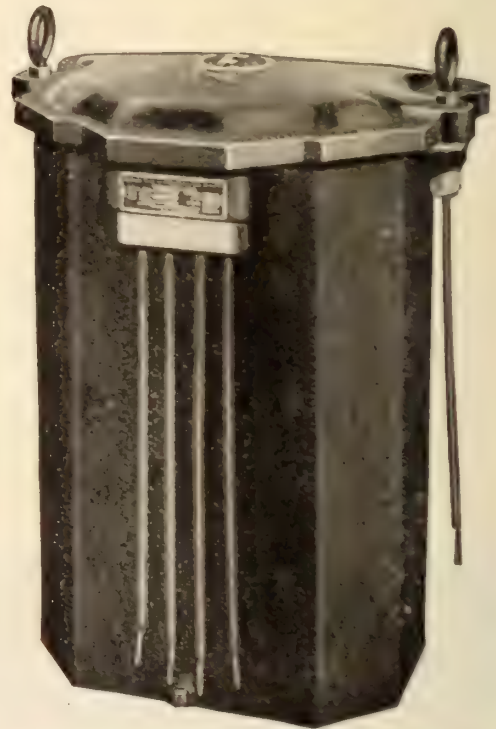
Type F.D. Integrating Watthour Meter

FERRANTI

"The Kid," the latest development in meters, weighs only 4 pounds. Now ready for shipment.

WRITE FOR BULLETINS

METERS



FERRANTI

Ferranti Transformers are strongly constructed with Welded Steel Cases. All terminals are well under the oil. Low charging current. Transformers are made in all standard sizes for quick shipment.

TRANSFORMERS

We will be glad to give particulars and quote prices on your requirements.

FERRANTI METER & TRANSFORMER MANUFACTURING COMPANY, LIMITED

26 Noble St.
TORONTO

Northwestern Eng.
& Supply Co.
Calgary

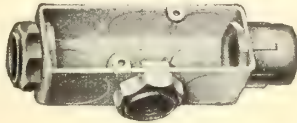
128 Henry St.
MONTREAL

Simpson Building
HALIFAX

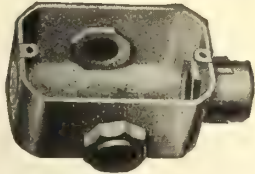
Northern Ontario
J. P. Bartleman
Timmins

145 Market Ave.
WINNIPEG

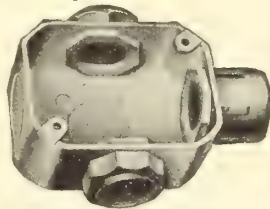
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



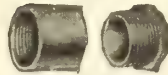
Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body

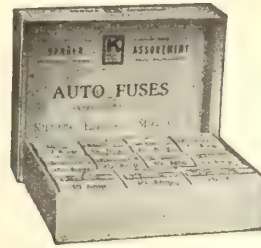


Catalog No. 1410
1/4" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment

"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

HIGH "ELPECO" TENSION LINES

Ammeter Switches

Bus Bar Clamps

Bus Supports

(For Indoor and Outdoor Service)

Choke Coils

(For Indoor and Outdoor Service)

Control Switches

(Remote Control)

Copper Fittings

(Cast and Tube)



Disconnecting Switches

(For Indoor and Outdoor Service)

Insulator Pins

Outdoor Sub-Stations

Pole Top Switches

Power Factor Switches

Special Fittings

Switchboard Structural Devices and Fittings

Switchboards

(A. C. and D. C.)

"Quality Shines Through the 'Elpeco' Lines"

Represented in Canada by

Ferranti Meter and Transformer Mfg. Co., Limited

Toronto

Montreal

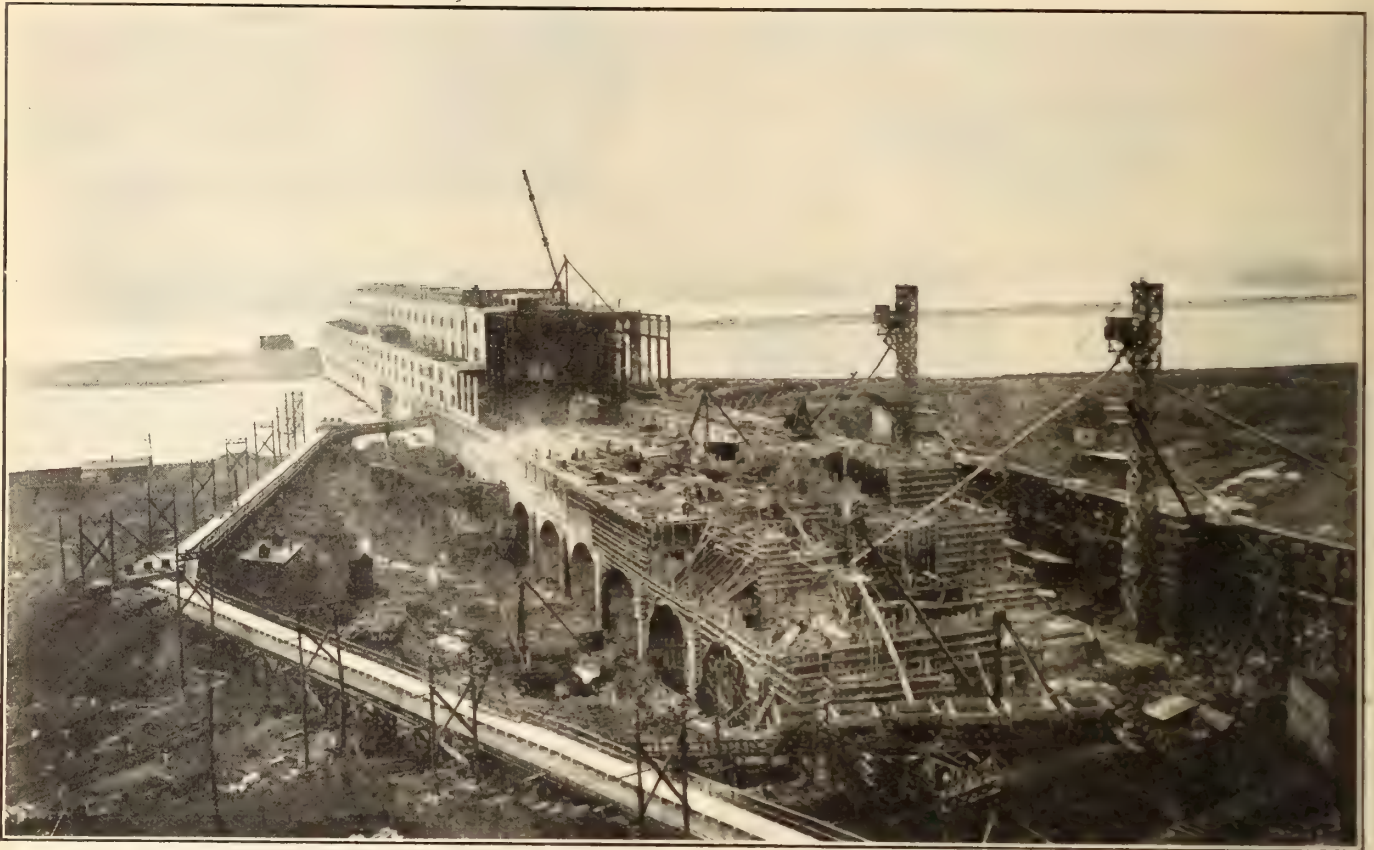
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Halifax

Timmins

Calgary

Write to Our Nearest Office. Bulletins, Prices and Information on request.



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Contracting Engineers

Pulp and Paper Mills, Hydro-Electric Plants,
Tunnels, Industrial Plants, Docks, Wharves,
Foundations, Water Supply, Railways, Ter-
minals, Ship Building, Pulpwood Barges, Ship
Repairing.

83 Craig St. W., MONTREAL

Telephone: Main 8030



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STORAGE BATTERIES

ARE REALLY DEPENDABLE
FOR ALL PURPOSES

CANADIAN MATERIALS
AND
WORKMANSHIP
BACKED BY
30 YEARS' EXPERIENCE



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SALES OFFICES:
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Electrical Contractor-Dealers

Fred. Thomson Co. Limited

*Manufacturing and Contracting
Electrical Engineers.*

**7-9-11-13 St. Genevieve Street
MONTREAL**

PHONE UPTOWN 6231
8292

Gunn Electric Co., Limited

366 Dorchester St. West

E. J. Gunn,
Manager.

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Garrioch, Godard & Co.

11 Elgin St., OTTAWA

*Complete Stock of Electrical Supplies
Prompt Shipments—Our Boast*

**Private and Municipal Telephone Lines and
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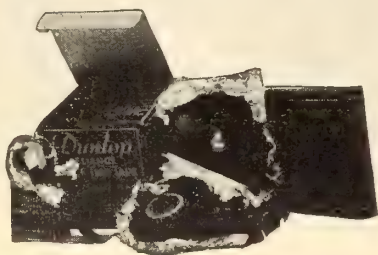
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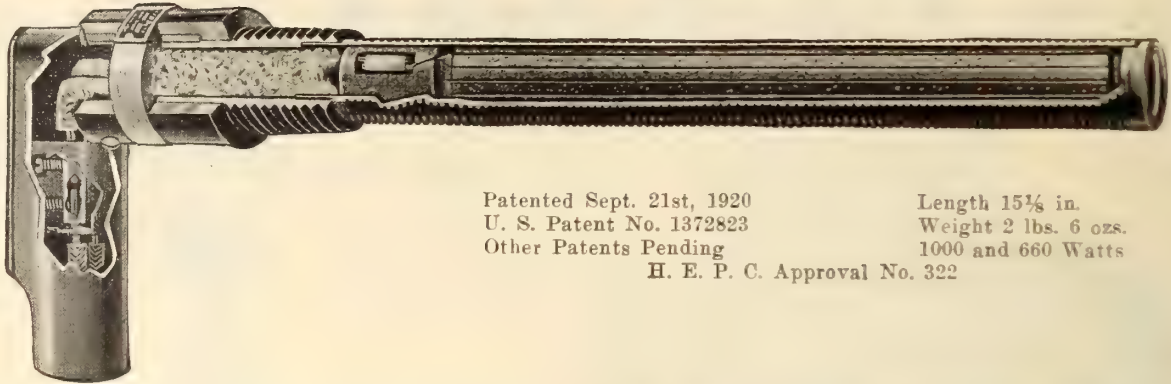
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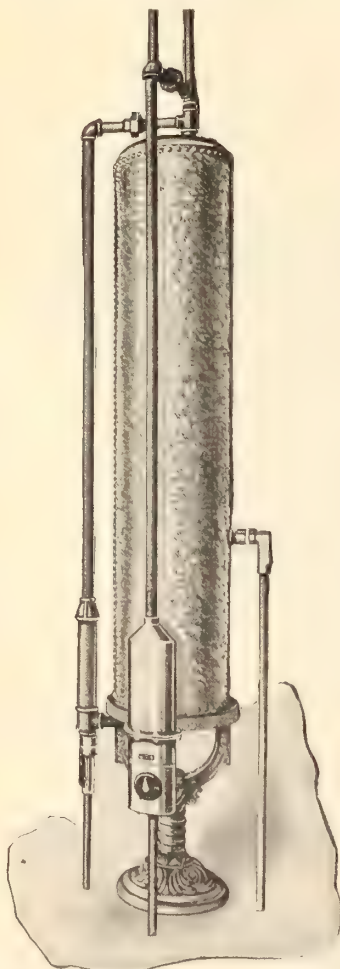
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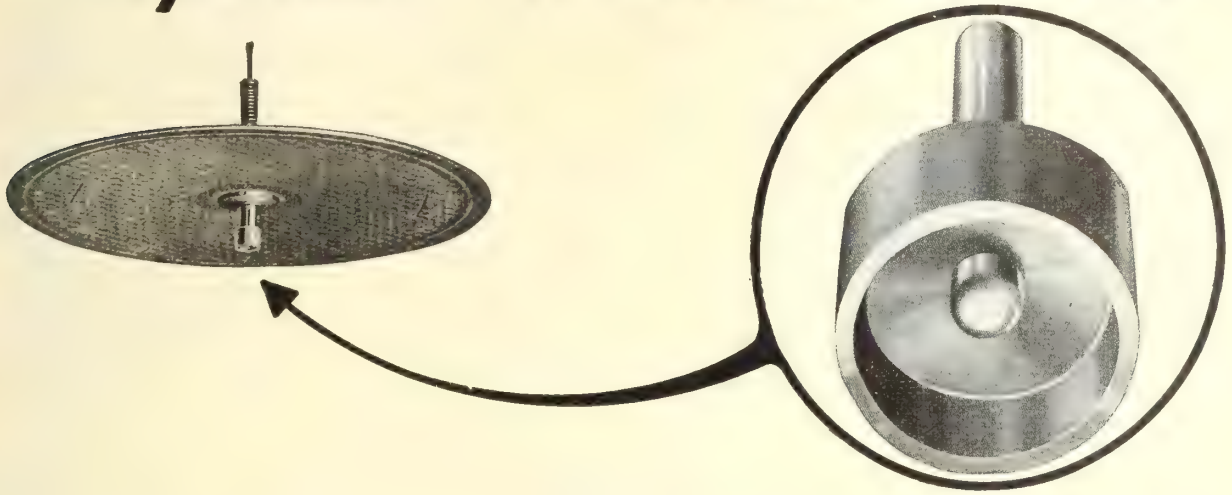
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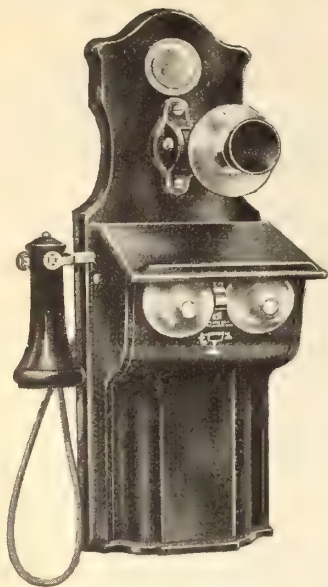
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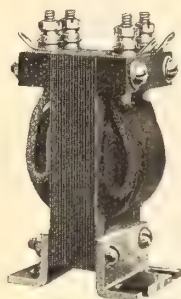
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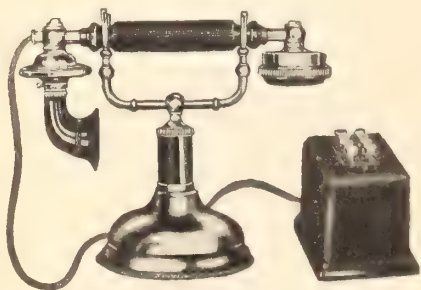
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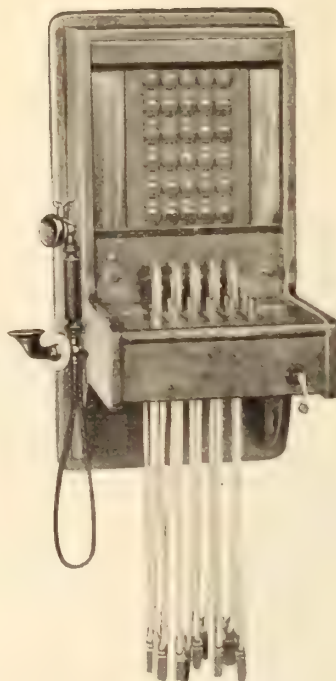
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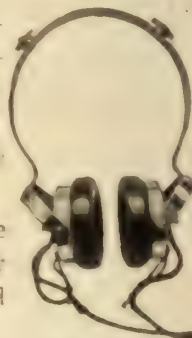


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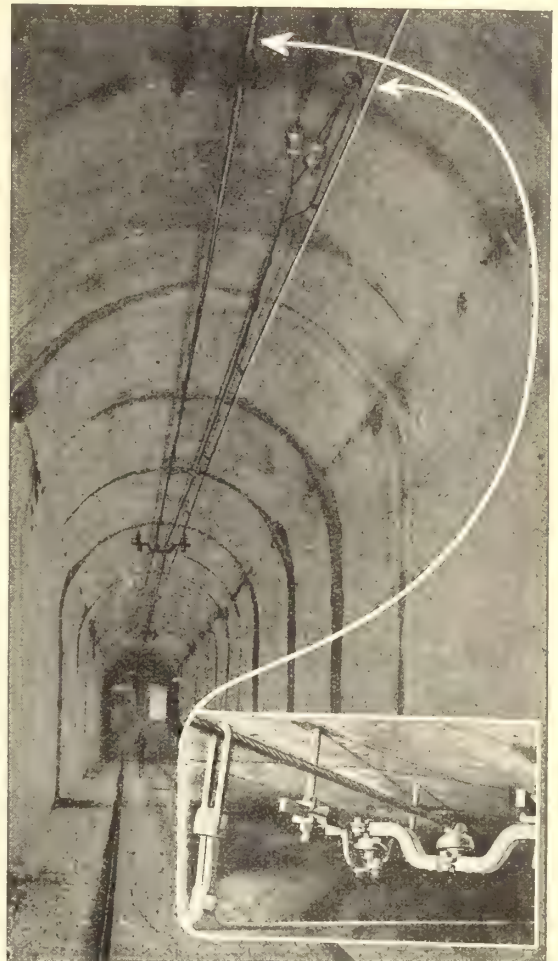
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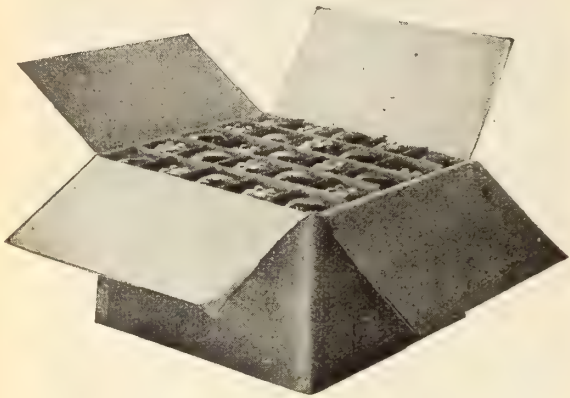
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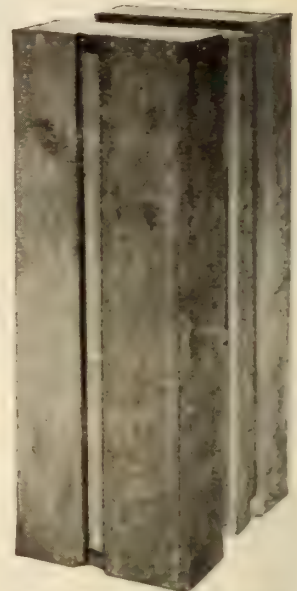
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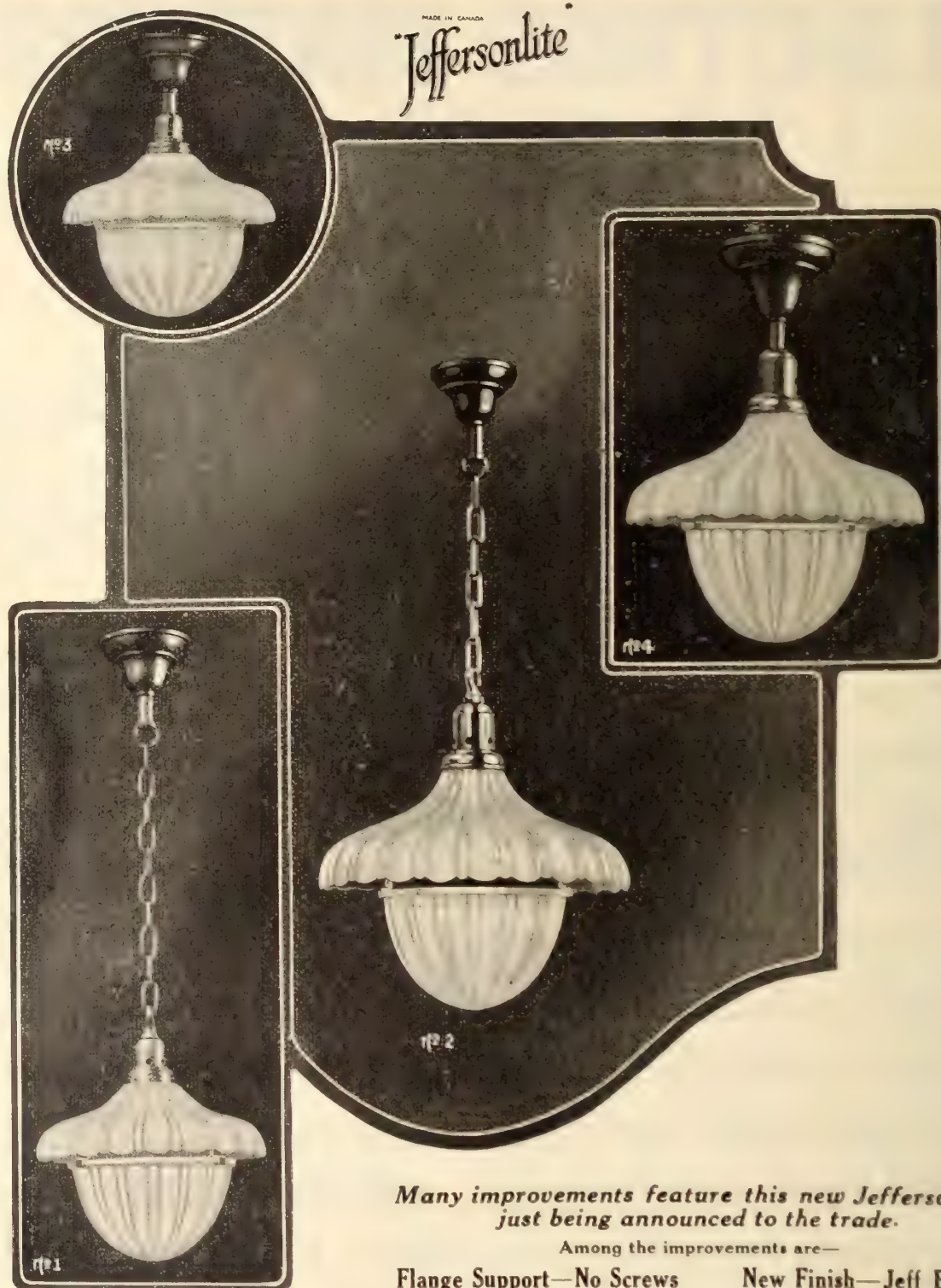
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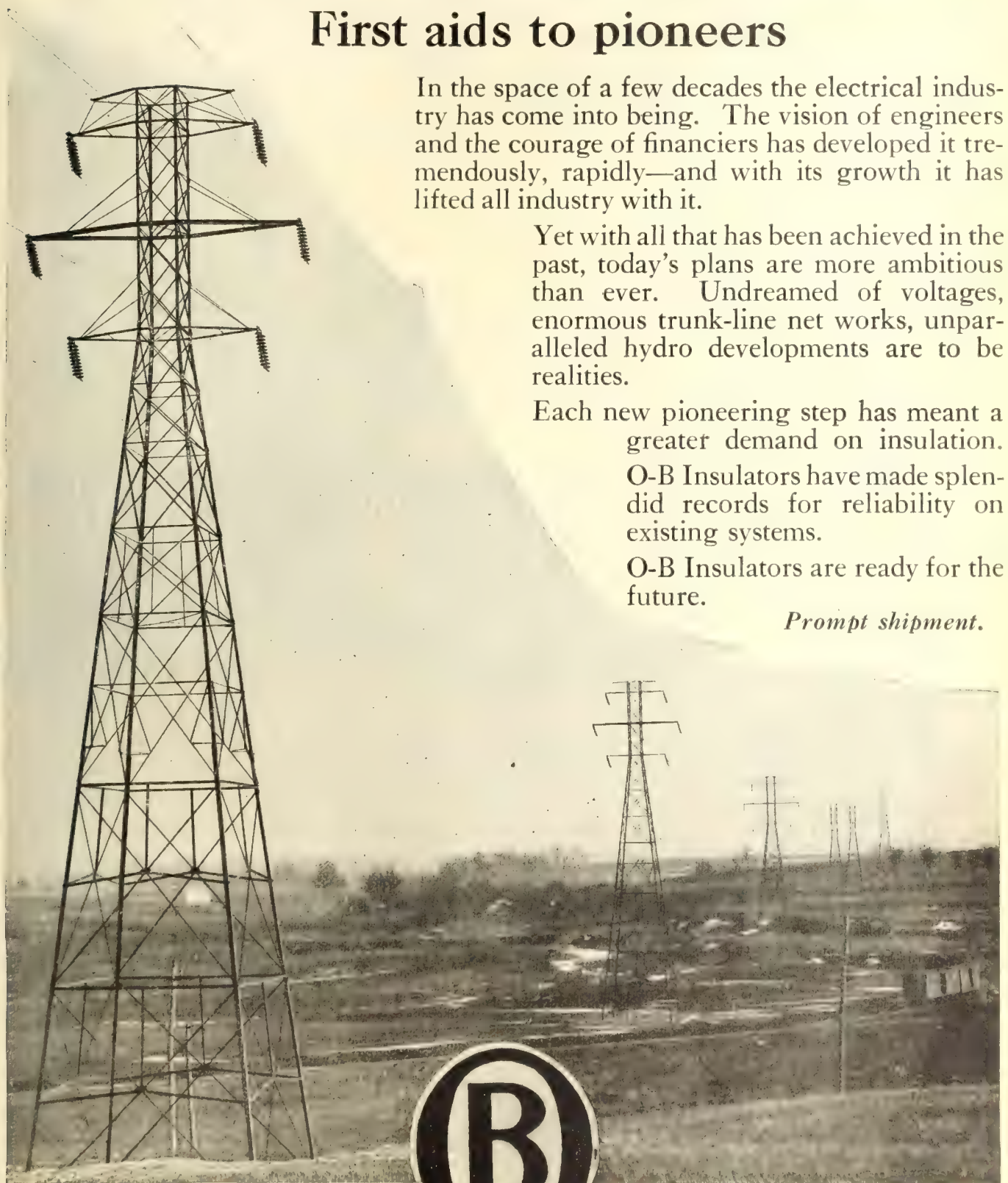
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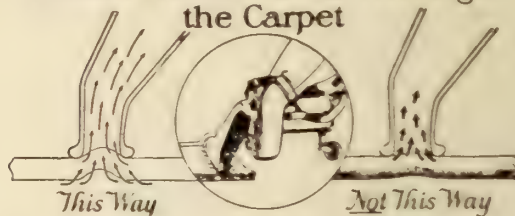
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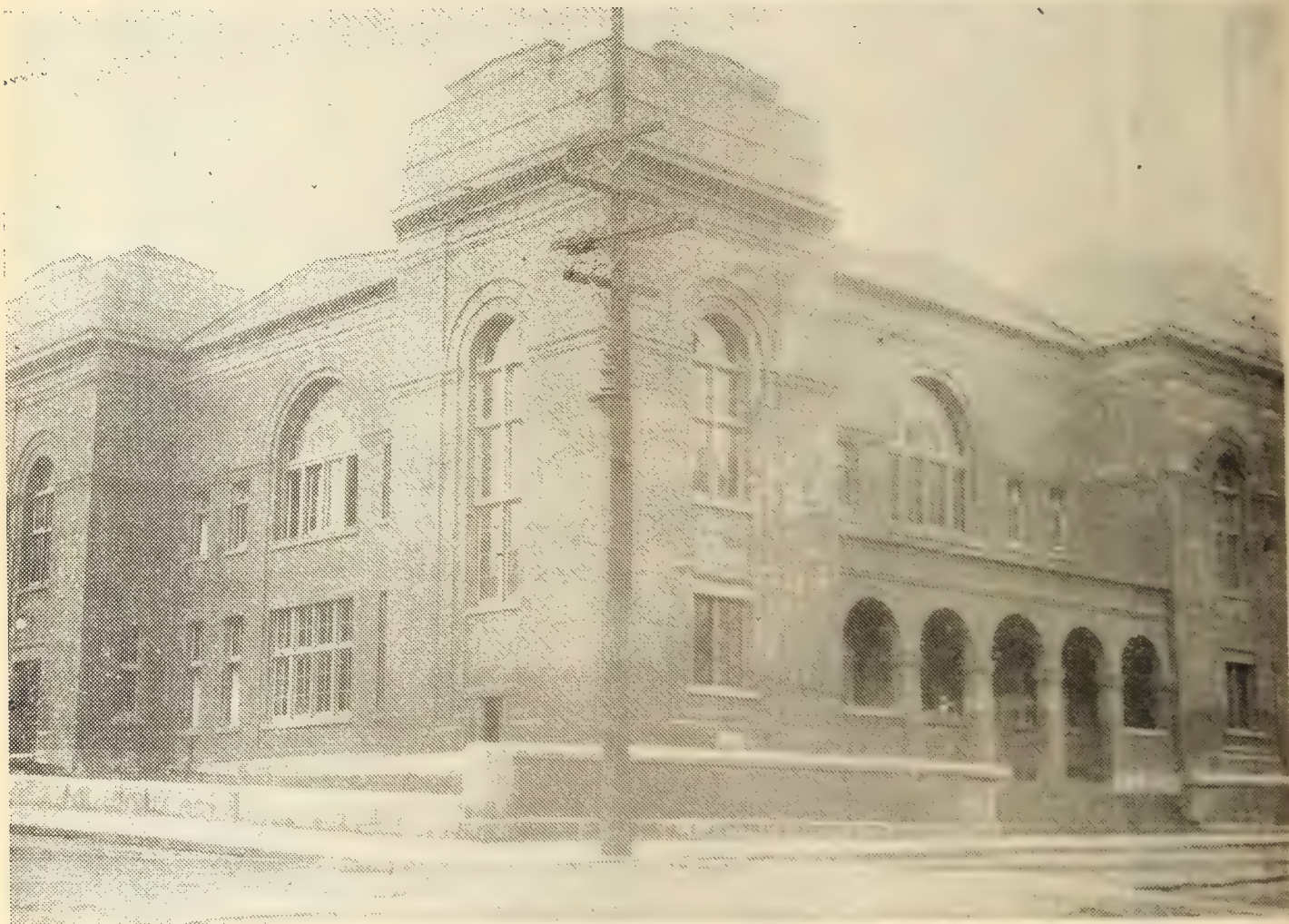
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This Whole Issue Devoted to Quebec Province

Our present issue is devoted to the Province of Quebec—her water powers, developed and undeveloped—her industries and activities, made possible and necessary largely through the possession of an ample and dependable supply of hydro-electric energy.

The water powers of Quebec may be said to be her greatest asset, though not by any means her only great asset. This province has large supplies of minerals of various sorts and a fair supply of coal. Next to her water powers, however, her greatest asset probably lies in a thrifty, home-loving population, an asset which, above all other things, makes for industrial success. Further, it must be mentioned that the Province of Quebec, and more particularly, perhaps, the city of Montreal, has gathered to itself a coterie of exceedingly capable and aggressive industrialists, including engineers, executives, and financiers. In point of wealthy citizens, the city of Montreal, undoubtedly, stands in the front rank, but even more conspicuous is the outstanding ability of the engineers and business executives who have built up a wonderful chain of power plants, electric railways, electric distributing systems, and manufacturing industries of almost every conceivable kind.

Quebec is a large province in point of area—so large, indeed, that the resources of the northern districts are, to a large extent, unexplored. Forests, minerals and water powers of unestimated value are known to exist, but the uncertainty of the whole situation is, perhaps, fairly illustrated by the fact

that Mr. Denis, of the Commission of Conservation, reports an estimate varying from six million horsepower to fifteen million horsepower as being available in the water falls of the province.

Of the developed water powers the most prominent, naturally, lie within easy transmission distance of the city of Montreal—natural, because a demand for power is essential to the supply of that power, and Montreal, being much the largest city in the province, has not only been in a position to demand power, but has also been in the very fortunate position of being centrally located with respect to a number of very large waterfalls. Shawinigan and allied interests to the north; Cedars Rapids, and associated power houses, to the south, along with the Canadian Light & Power development, have so far been able to supply the demand of this cosmopolitan populace and the outlying districts. This will be true also for many years to come, for the supply not yet developed, though far from being inexhaustible, is still very great. Special articles in this issue deal specifically with various phases of the industrial life of the province.

* * *

A valuable factor in the development of the water powers of the Province of Quebec has been the operations of the Quebec Streams Commission. The function of this body have included a study of the conditions of stream flow and regulation, and, in certain specific cases, most effective constructive work in the way of conservation of hydro-electric energy has been accomplished. The cost of this work has not been laid upon the shoulders of the public at large, but has been passed out to the companies benefitting by these improvements, in the form of an annual rental; i.e., the charge is paid by those who benefit, and not by the province as a whole.

The merchandising end of the industry, i.e., the selling of light, heat and power in its various forms, is also being placed on a scientific basis. Laws have been placed on the Statute Books to regulate who shall and who shall not make electrical installations; what one's qualifications must be before one may aspire to accept contracts for electrical work, etc. In this way the public is safeguarded, as well as the industries. Further, the various factors in the electrical industry, i.e., central stations, engineers, manufacturers, wholesalers, and retailers, have all been brought together into one comprehensive organization to the end that there may be no overlapping, no wasted energy, no working at cross purposes, but that the whole force of the industry may be concentrated on the one aim, namely, the application of electricity to the greatest possible number of operations in the factory, store, and home. The difficulty of the two languages in this association has been overcome by the formation of two sections, each maintaining an intimate relationship, each keeping in touch with and supplementing and assisting the activities of the other.

The Province of Quebec bids fair, therefore, to become one of the most highly developed sections, electrically, on the whole continent. In certain districts it has already been claimed that a sales saturation equivalent to approximately \$40 per year per individual has been reached. It is doubtful if this has been exceeded anywhere in America, and it is certainly greatly in excess of the average. We offer this summary of the electrical possibilities and activities of the Province of Quebec to our readers in the hope that it may inspire the province to still greater accomplishments and possibly also inspire the other provinces to increase and improve their activities. The time will come shortly, we hope and trust, when all our provinces, linked closer together by one all-embracing organization, will find themselves in a position to do greater work, electrically, than any single province, or group of provinces, can do individually, to make this country "Electrical Canada" from the lowliest workman's home to the millionaire's palace.

The Keynote of Permanent Industrial Development is "Power"

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Is one of the biggest and surest assets of the Province of Quebec. This is the power that never fails and yet does not grow less with use. A limited survey of the Province's water resources yields a grand total between six and seven million horsepower. Various estimates greatly exceed this amount. With only a small fraction of this under control Quebec Province is forging into a foremost position in the industrial world. A brief survey

By LEO G. DENIS

Engineer Commission of Conservation, Ottawa.

Canada's generously distributed water-power resources constitute one of her most valuable assets in the future industrial competition among nations. Water-power has always been a most important factor in the economic life of this country. It is estimated that, in 1901, the water-power utilized in the various industries of the Dominion amounted to 354,000 h.p., while a careful survey made in 1911 revealed a total development of 1,016,521 h.p. In 1915, this had been increased to more than 1,700,000 h.p., while recent figures show a total water-power installation of some 2,500,000 h.p. This rapid progress can be attributed, in a large measure, to the bountiful potential supply from which power can be drawn and it is of interest in this connection to form an idea of our latent possibilities. Unfortunately, it is impossible to give, for any country, an absolutely definite total regarding this natural resource, owing to the number of factors to be considered. Differences arise from allowances and facilities for artificial storage, from adaptability of industry to fluctuation in flow, as in certain electro-chemical processes which may be worked intermittently, thus adapting the demand for power to the flow available, also from the feasibility of using an auxiliary steam plant during the period of drought, if artificial storage is not practicable, and from many other causes which need not be specified in detail.

Quebec Water-Power Administration

A recent estimate as to the water-power possibilities in Canada shows a total of nearly 20,000,000 h.p., divided between the different provinces as follows:

Province	Estimated Possibilities
Quebec	*6,000,000 h.p.
Ontario	5,800,000 h.p.
Manitoba	3,218,000 h.p.
British Columbia	3,000,000 h.p.
Saskatchewan	567,000 h.p.
Alberta	466,000 h.p.
New Brunswick	300,000 h.p.
Nova Scotia	100,000 h.p.
Prince Edward Island	3,000 h.p.
Yukon	100,000 h.p.

* This figure represents known possibilities; estimates up to 15,000,000 have been made for this province, including New Quebec.

If we now turn to the province which this article is intended to cover we find that the Government of Quebec

has long recognized the importance of water-power in the development of that province. Since 1897 local water-power investigations have been carried on by the Department of Lands and Forests, and the work in connection with the water-powers of the province is now efficiently conducted under two separate organizations working in co-operation. The Hydraulic Service of the Department of Lands and Forests has charge of all questions relating to streams and lakes, including their administration and the leasing of water-powers, water lots and other water rights for various uses, while the authorization for the construction of dams and similar works is also dealt with by this Service. The Quebec Streams Commission devotes its attention more particularly to the construction of storage dams and the investigation of water resources. Conservation storage forms one of the most important branches of this Commission's work; its principal undertaking is on the St. Maurice river, where an immense storage reservoir, the largest in the world for power purposes, has been constructed. Other storage undertakings of the Commission include operations on the St. Francois and Ste. Anne de Beaupre rivers, while studies for future work include numerous other streams on which comprehensive water conservation is contemplated.

It may be added in this connection that in addition to the abounding water resources found in the province, the greatest asset promising much for future development lies in the far-sighted policy of the Government in water-power administration and the incentive and help given to hydraulic projects by the Quebec Streams Commission through its activities in water storage and other improvements.

Much has been written on the water-power possibilities of Quebec province. Some four years ago Mr. A. Amos, Chief Engineer of the Hydraulic Service, gave a very comprehensive review of the hydraulic resources of the province in a booklet published by the Department of Lands and Forests. A recent paper read before the Engineering Institute of Canada by Mr. O. Lefebvre, Chief Engineer of the Quebec Streams Commission, also provides much valuable information in this connection. As previously noted, it is difficult to arrive at an accurate figure representing the total possibilities of the province. A total of 6,000,000 h.p. has been estimated as the total for the known sites of the whole province, while Mr. Amos has estimated the power available in Quebec south of the 50th parallel at 5,000,000 h.p.

The manner in which the province disposes of its wa-

ter-powers protects both public and private interest. If a water-power cannot develop more than 200 horse-power, the Government sells, for a fixed price, a lot in the river bed and the lots of land on the banks, if owning any, including the power than can be developed.

When the capacity exceeds 200 h.p., the concession generally takes the form of a lease. The terms of such leases are as uniform as possible and provide for a yearly charge; a portion of the payment covering rental for land is fixed, while the remainder is on a basis of 50 cents per h.p. Before development work can be started, the grantee has to submit plans of the proposed installation; he must begin work within two years and produce power within four, a deposit being required as a guarantee that the various conditions will be fulfilled. The leases vary in duration from 25 to 99 years, in accordance with the importance of the water-power and the amount of work required for its development.

Montreal District, Rapids of the St. Lawrence

In Montreal district and in the thickly populated portion of the province, south of the St. Lawrence, undeveloped water-powers are still numerous. The Montreal district is generously supplied with hydro-electric power and, in this respect, its position is second only to that of the Niagara district. The principal source for future supply is the rapids of the St. Lawrence river, and in this connection the momentous project now being considered by the International Joint Commission is of particular interest. This involves a question which has attracted a very great amount of attention during the past two years in connection with the combined interests of power development and navigation. The two features of navigation and power production have been closely combined in connection with the scheme and while the former aspect is of much interest in transportation problems to many portions of Canada and the United States the development of power is of particular interest to the province of Quebec as the largest portion of the power involved lies wholly within this province.

The St. Lawrence as a primary source of hydro-electric energy has long been considered one of the most valuable assets of the world and the proportions of the undertaking have thus far retarded definite action or policy with regard to its exploitation. The power portion of the river from lake Ontario to Montreal involving some 2,000,000 horse-power or more has to be considered as a whole. Consequently, although the United States' share of the total available power is relatively small, the project assumes an international aspect and had, therefore, to be referred to the International Joint Commission. This body has been conducting an extensive series of hearings in connection with the proposed scheme at various centres in Canada and the United States covering both countries practically from the Rockies to the Atlantic. The physical or engineering problems have been referred by the Commission to an international board of engineers who are to shortly report on this phase of the undertaking.

Portion of Province South of the St. Lawrence

If we now consider the portion of the province south of the St. Lawrence, the first tributary of importance below Montreal is the Richelieu, draining lake Champlain, but all the power on it is being fairly well utilized.

Next, the St. Francois river has attracted considerable attention of late, the Quebec Streams Commission having recently completed a very comprehensive storage regulation on it which has greatly increased the power possibilities of the river. In its total length of 120 miles between lake St. Francois and its mouth, it has a descent of 900 feet,

while the river basin includes an area of nearly 4,000 square miles. The St. Francois river includes several important tributaries also affording numerous water-powers. The storage dam on lake St. Francois creates a storage capacity of 12.2 billion cubic feet, covering an area of 438 square miles and supplies 500 second-feet above the natural flow of the river, while lake Aylmer, whose outlet is also controlled by a dam, has been calculated to supply an additional flow of 150 second-feet. To give an idea of the effect of this on the power possibilities of the river, it may be said that if the total descent in the river could be utilized, 20,000 h.p. would be available on the St. Francois river alone through the use of this storage. The total water-power developed on the river before the storage was in operation amounted to over 32,000 h.p. Several of these developments did not operate to full capacity continuously but, with the new storage in operation, it is expected to almost completely remedy low-water conditions.

The West and East branches of the Nicolet and the Becancour river fall into the St. Lawrence, from the south, below the St. Francois. The West branch of the Nicolet



Montmorency Falls, Montmorency River, Quebec.

and its tributaries have many small water-powers, while the Becancour river has an important undeveloped site at Mad-dington fall.

The Chaudiere, with a drainage area of 2,600 square miles, is important from a water-power viewpoint. A fairly large amount of power has already been developed on it while the Quebec Streams Commission has had a better regulation of its flow under serious study.

The possibilities of riviere du Sud are being partially utilized, while other rivers, including the St. Nicolas, Trois-

Saumons, Ouelle and Kamouraska, are known to possess potential powers, but definite figures are not available.

The riviere du Loup, falling into the St. Lawrence over a beautiful cascade at Riviere-du-Loup, contains many water-powers. A total of over 3,500 h.p. is already utilized in the manufacture of pulp and in generating electric energy.

The Rimouski and Metis (or Mitis) rivers merit mention in connection with water-powers. The former develops 2,000 h.p. under a head of 52 feet for the manufacture of pulp, while the latter affords a site capable of developing 3,000 h.p. under a head of 115 feet.

The Madeleine is one of the most important rivers of Gaspé county. With its tributaries, it has a drainage area of 450 square miles, and is reported to offer many water-power possibilities, including sites at Grande chute, with a head of 200 feet and 10,000 h.p., and at Terrace rapids, twenty miles from the mouth, with a head of 283 feet and 10,000 h.p. capacity.

Among the principal rivers draining into Chaleur bay, the Bonaventure, Matapedia, Milniket and Matalik have small water-powers in actual use, principally at lumber mills; these and other streams also possess power sites yet undeveloped.

Quebec North of the St. Lawrence

On the north side of the St. Lawrence, the more thickly settled district above the city of Quebec is also well provided with water-powers, many of them in actual use.

The Ottawa river, debouching in several branches near Montreal, and, next to the St. Lawrence, the largest river of Eastern Canada, is rich in water-powers. Their value has been greatly augmented by storage operations in the

upper waters although only a portion of the extensive project has thus far been completed.

The Ottawa, for the greater part of its course, forms the boundary between Quebec and Ontario, and its inter-provincial powers are equally divided between the two provinces, while the storage activities are conducted by the Ottawa River Storage Branch of the Federal Department of Public Works. The three reservoirs now utilized have each an area of some 100 square miles and water is raised 15 feet on each, giving a total of 125 billion cubic feet or an additional flow of some 10,000 second-feet during the shortage period. The power possibilities under natural conditions reached the large total of 422,000 h.p.; with a regulated flow from these storage reservoirs and by taking the full advantage of descents at various sites this power could be doubled, as shown by the following estimate given in a recent report of the Ottawa River Storage Branch:— Quinze group, 170,000 h.p.; Timiskaming group, 120,000 h.p.; Mackey group, 170,000 h.p.; Pembroke group, 38,000 h.p.; Coulange group, 94,000 h.p.; Portage du Fort group, 35,000 h.p.; Chats group, 100,000 h.p.; Ottawa group, 135,000 h.p.; Grenville group, 70,000 h.p.; Carrillon group, 135,000 h.p.; Riviere des Prairies group, 25,000 h.p.; total, 1,092,000 h.p.

The tributaries of the Ottawa on the Quebec side abound in power possibilities, and comparatively few of them have been utilized. There are, however, important developments on the North river, on the Rouge river and on the Lievre river. Numerous undeveloped powers also exist on these rivers, while the Gatineau, the largest tributary of the Ottawa, has over 20 known possible power sites, aggregating more than 200,000 h.p. at minimum flow. The High fall on the Lievre river may also be noted, where 32,000 h.p. is



Lord's Falls on the St. Francis River, at Drummondville.



Rapids in Grand
Discharge, Saguenay
River, Quebec

available under a head of 180 feet. The smaller tributaries, such as the Kipawa, North Nation, Cambria and others, also possess both utilized and latent powers.

Entering the St. Lawrence below Montreal is L'Assomption river, with its important tributaries, the Ouareau, Achigan, St. Esprit and Noire. The basin comprises fairly large latent water-powers, including sites of 2,000 h.p. and 3,000 h.p. capacity at Rawdon and St. Jean-de-Matha, but, thus far, only the smaller powers are utilized, the largest developing 450 h.p. The Maskinonge, du Loup (en haut) and Machiche rivers, all falling into lake St. Peter, and possessing only small developments, contain numerous possibilities, among which may be mentioned a site of 4,000 h.p. capacity on the Maskinonge at Ste. Ursule, and one of 2,000 h.p. on riviere du Loup at Magnan fall.

The St. Maurice river, the most important tributary of the St. Lawrence between Montreal and the Saguenay, has a drainage basin of 16,200 square miles. Apart from its size, the St. Maurice is conspicuous in many respects. At Shawinigan Falls it affords power for the largest concentration of developments in the province, and although other large water-powers on it have already been harnessed, many important sites still await development. The most interesting feature respecting this river is the storage undertaking of the Quebec Streams Commission in its upper waters. The principal reservoir is created by the Gouin dam at La Loutre, affording a capacity of 160 billion cubic feet, the largest power reservoir in the world, while it is only slightly exceeded by the Gatun reservoir, used in connection with the navigation of the Panama canal, which is reputed the largest known. When full, the area covered by La Loutre reservoir is over 300 square miles, the water being backed up 135 miles. It has vastly improved the water-power facilities of the river and is a decided benefit to the industries of that portion of the province. By the operation of this reservoir the minimum power available on the river has been doubled, increasing the low-water flow at Shawinigan from 6,000 second-feet to 12,000 second-feet. The most important rapids and falls have recently been enumerated in a paper by Mr. O. Lefebvre, Chief Engineer of the Quebec Streams Commission, as follows:— The Gres, 44 descent or head in feet; Shawinigan 135; Grand Mere, 40; La Tuque, 90; Blanc rapid, 210; Des Coeurs rapid, 93; Allard rapid, 55. The Shawinigan and Grand Mere sites are being

fully utilized under respective heads of 150 feet and 75 feet, while a portion of La Tuque power is also in use.

In addition to the important water-powers on the St. Maurice itself, many sites are also found on its tributaries. Among these are the Shawinigan, Milieu, Bostonnais, Vermilion, Manouane and Ruban rivers, all affording possibilities at various sites ranging in capacity up to 1,500 h.p.

Another important tributary of the St. Lawrence, the Batiscan river, also affords numerous latent water-powers. A plant of some 2,000 h.p. capacity near St. Narcisse has been in operation for many years, while in the first 54 miles from its mouth, the Batiscan contains sites with heads varying from 10 feet to 69 feet and capable of developing a total of approximately 25,000 h.p. at the low-water stages.



St. Anne's Falls on the St. Anne River.

In connection with the Quebec City district, which is generously supplied with energy from a number of hydro-electric plants, it is of interest to note another of the activities of the Quebec Streams Commission undertaken for the benefit of one of these plants. A storage dam has been constructed at the outlet of lake Brule on the Ste. Anne de

Beaupre river to increase the power available at the St. Fereol plant, Seven Falls, where a head of 410 feet is utilized. It is expected to increase the minimum flow of the river from 165 second-feet to over 200 second-feet, while additional storage is also contemplated.

Between Quebec district and the Saguenay the only fairly large river on the north shore is the Malbaie, which enters the St. Lawrence at the well-known summer resort of the same name. It has a drainage area of 800 square miles and supplies two developments at Malbaie, while many other falls are known to exist on the river. By proper regulation on its many lakes, the minimum flow could be greatly increased.

Manicouagan), with over 450,000 h.p.; and the Portneuf, Sault-au-Cochon, Manitou, St. Jean, Romaine, St. Augustin and Natashkwan, each with from 10,000 to 30,000 h.p.

The Grand fall, on the Hamilton river, has long been known for its power possibilities, and its development for the production of chemical fertilizer and other industries has been under consideration; the total descent, extending over twelve miles, is 760 feet, which, if fully developed, would produce 300,000 h.p., while another site on this river is estimated at 86,000 h.p.

Hudson Bay Basin

On the large rivers flowing into James bay many attractive power possibilities are reported where these have



Hemming's Fall, on St. Francis River, Quebec—A typical Quebec scene.

The Saguenay, or Lake St. John, district is one of the most important in the province from a water-power viewpoint and its rapid development is due in a large measure to attractive industrial opportunities offered by this natural resource. The developments in actual use are quite numerous, but the latent powers of this district are even much greater than those which have already been harnessed. The Saguenay itself offers a very attractive site as it debouches from lake St. John through the Grande-Decharge, and plans have been elaborated to utilize this power in connection with an important industry. Under a total head of 300 feet, divided into two steps, it would be possible to produce 300,000 continuous horse-power. This capacity could easily be increased to 600,000 h.p. by using lake St. John as a storage reservoir, a project in which the Provincial Government intends to co-operate.

Among the other rivers rich in water-powers and awaiting development may be mentioned the Ashwamuchuan (or Chamouchouane), whose known possibilities total 160,000 h.p.; the Peribonka (or Peribonca) and Mistassini with 200,000 h.p. each; and the Metabetchuan, Shipshaw and Muskosibi, with between 10,000 h.p. and 30,000 h.p. each.

The north shore, below the Saguenay, also contains large rivers offering attractive water-power possibilities. Some of the sites are already being utilized mainly for pulp and lumber mills, some of which are of fairly large capacity. The most important rivers known to possess latent water-powers are the Outardes, with 150,000 h.p.; the Bersimis (or Betsiamites), with 75,000 h.p.; the Manikouagan (or

been explored. The known water-powers on the Megiskan (or Megiscane) river aggregate over 10,000 h.p.; on the Bell river, 15,000 h.p.; on the Harricanaw (or Harricana), 175,000 h.p.; on the Nottaway, 300,000 h.p.; on the Rupert, 250,000 h.p.; and on the Eastmain, 340,000 h.p. While these are probably the largest in the region, there are numerous latent possibilities of a smaller order on rivers in closer proximity to the National Transcontinental railway and several sites have already been investigated on the Kinojevis, Kewagama and La Sarre rivers.

To sum up the water-power situation in Quebec, it may be said that, in the more thickly populated portions, hydraulic resources are playing a large part in industrial development. While their absorption has already created a demand greater than the supply in certain quarters, this deficiency is being remedied by the extensive conservation storage operations which have been initiated by the Provincial Government through the Quebec Streams Commission. In the more sparsely populated portions of the province, with few exceptions, water-powers of great magnitude still remain undeveloped. Although numerous sites are utilized in the pulp and lumber industries, great opportunities still remain for the use of latent powers in similar or other undertakings.

The Electrical Alloy Company, manufacturers of high resistance wires and ribbons, are distributing a recent bulletin on "Karma" resistance wire, which is descriptive of this material.

The Quebec Streams Commission

This body is appointed by the provincial government to study the flow of the rivers and regulate the use. Storage dams have been built and more are planned. The minimum of power in one river alone was increased four hundred thousand horsepower. A brief survey of this commission's work

By O. LEFEBVRE, Chief Engineer Quebec Streams Commission.

The Quebec Streams Commission has done a large amount of work which has made very important power sites considerably more valuable, both in the case of developed and undeveloped water powers. This Commission was appointed in the latter part of the year 1911. Its powers were defined by Law I George V, chapter 5, 1910, and among the duties it was called upon to perform there are the following:—

1. To devise just and practical rules respecting the flow, the drawing off, the disposal, the distribution, the storage and generally respecting the preservation and management of running waters in the Province of Quebec;
2. To consider whether it is expedient to have the rivers of the province classified as navigable and floatable rivers, and rivers which are not navigable nor floatable, by an administrative commission, or otherwise, according to uniform rules, and to submit such rules, if it be advisable.

The Commission is composed of three members: a chairman and two commissioners. The first chairman was the Hon. S. N. Parent, former Prime Minister of this province. His successor and the present chairman is the Hon. Honore Mercier. The two commissioners are Mr. Wm. I. Bishop, civil engineer, and Mr. Arthur Amos, chief engineer of the Hydraulic Service at Quebec.

The first work which the Quebec Streams Commission was called upon to do was an investigation of the characteristics of the rivers of this province and, in 1913, it submitted a report recommending that the said rivers be classed as public or private property—according to the area of their watershed. It recommended that the expressions “navigable” and “floatable” be eliminated, and all rivers having a drainage area of three hundred square miles or over would be public property, and that all rivers with an area less than three hundred square miles would be private property.

The most important work the Commission has performed to date is the regulation of the flow of the St. Maurice river and the St. Francois river, as well as that of the St. Anne river in the county of Montmorency. In the case of the former river, a complete control of the water supplied by a drainage basin of 3,650 square miles has been established near the head waters of the river. A few details regarding these works and the results obtained therefrom should prove interesting.

The St. Maurice River

This river flows into the St. Lawrence at Three Rivers, about half-way between Montreal and Quebec. Its drainage area is 17,000 square miles and the river is about 365 miles long. The difference in level between its head waters and its mouth is approximately 1300 feet. This grade is distributed in a large number of rapids and some high falls—the most important of which are: The Gres, 44 feet; Shawinigan, 135 feet; Grand Mere, 40 feet; La Tuque, 90 feet; Rapid Blanc, 210 feet; Rapid des Coeurs, 93 feet; Rapid Allard, 55 feet. Of these powers, full developments have been carried out at Shawinigan under a head of 150

feet, and at Grand Mere under a head of 75 feet. At the latter point, the natural fall is forty feet, but by building a high dam the water is backed up about 25 miles and small falls and rapids are flooded.

Flow of the St. Maurice River

Under natural conditions, the minimum flow of the St. Maurice river at Shawinigan was 6,000 cubic feet per second. It reached the absolute minimum of five thousand two hundred second-feet, but for a few days only during the period of 1900-1912. Daily records of the flow of this river at Shawinigan have been kept by the Shawinigan Water & Power Company from 1900 to date. As the demand for power was increasing largely, the need of increasing the minimum flow was felt more rapidly, and the St. Maurice Hydraulic Company, in 1910, built three small storage dams on the Manouane river—a tributary to the St. Maurice river, into which it flows near the Indian post at Weymontachingue, about 188 miles above Shawinigan. These small reservoirs paved the way for the regulation on a larger scale as carried out by the Commission, for they had proved that the water let out from these small dams in winter reached Shawinigan with comparatively little loss. This possibility had been doubted somewhat.

In 1912, the St. Maurice Hydraulic Company, Limited, applied to the legislature for authorization to carry out a storage scheme in the upper St. Maurice. The Government did not deem it advisable to grant the power demanded, but decided that the Quebec Streams Commission was the proper body to look into the question and carry out the scheme if it was thought advisable. After a thorough examination of the whole question, it was decided to build a dam at the foot of a large series of lakes at a point two miles above the falls called “La Loutre.” The construction of the dam was started in 1915 and it was completed in the month of December, 1917. The cost of the total scheme, including the acquisition of the three storage dams on the Manouane river, amounts to \$2,500,000.

As a result of the control of the waters by this dam, which is now called “the Gouin Dam,” the minimum flow of the river is kept at twelve-thousand second-feet at Shawinigan. Therefore, the primary power capacity of the plants at Shawinigan and Grand Mere has been doubled.

For the benefits derived from the storage, the power companies are paying to the Government an annual sum amounting now to \$191,000. This annual revenue will be largely increased when other water powers are developed.

The capacity of the reservoir created by the Gouin Dam is estimated to be one hundred and sixty billion cubic feet, and it is the largest power reservoir in the world—having about twice the capacity of the Assuan reservoir in Egypt. It is, however, exceeded by the Gatun reservoir built in connection with the Panama Canal—the capacity of which is one hundred and eighty-three billion cubic feet—but it is only fair to say that part only of this water can be used for supplying part of the Panama Canal. The capacity of some of the largest reservoirs in the world are:— Gatun, 183,000,000,000 cubic feet; La Loutre, St. Maurice, 160,000,-

000,000 cubic feet; Assuan, Nile, 78,000,000,000 cubic feet; Roosevelt, Salt Lake, 52,000,000,000 cubic feet; Pathfinder, North Platte, 45,000,000,000 cubic feet; Shoeshone, Shoeshone, 20,000,000,000 cubic feet.

The area of the lakes and the rivers affected by the Gouin Dam is two hundred and nine square miles, and when the reservoir shall be full the area of the lake will exceed three hundred square miles. The water is backed up a distance of one hundred and thirty-five miles above the dam.

Minimum Increased by 400,000 h.p.

The amount of power due to the storage has been calculated by using the flow curve of the lowest year during the period 1900-1912—that is the year 1906—and the figures arrived at were 32,000 horse-power-years in the case of Shawinigan, and 16,000 horse-power-years in the case of Grand Mere. It is estimated that the low water power possibility of the St. Maurice river has been increased by about four hundred thousand horse-power.

The control of the head waters of the St. Maurice river is also beneficial to the lumbering trade in this valley. The flood waters in the spring are not so high and the minimum flow is very much increased. Therefore, the driving of logs down the river may be carried out under better conditions. Water may be supplied for the log drive at a time when it is not required by the power companies and it is needed to destroy log jams which are formed at certain rapids. For example, in July, 1919, about one million and a half logs were jammed and aground in Rapid Blanc, about thirty-five miles upstream from La Tuque. The Commission was asked to help the Driving Association out of this difficulty by giving a shot of water. The Gouin Dam was opened to discharge thirteen thousand six hundred second-feet during twelve days, raising the water to nearly flood conditions. All of the jammed timber was brought out of the rapid and floated down to La Tuque in about two weeks.

The next storage scheme which the Commission was called upon to study was the partial regulation of the discharge of the St. Francois river, by a control of water supplied to lake St. Francois and to lake Aylmer, both near the head of the river.

Lake St. Francois is located six miles east from the town of Disraeli and about ten miles southwest from the town of Thetford Mines. River St. Francois has a drainage area of four thousand one hundred square miles and drains the largest part of the Eastern Townships. It flows into the St. Lawrence at the head of lake St. Peter and runs through the towns of Drummondville, Richmond, Windsor Mills, Sherbrooke, East Angus and Disraeli. The distance between lake St. Francois and lake St. Peter is about one hundred and twenty miles, and the slope is practically nine hundred feet. This slope is distributed through numerous falls and rapids, making the river very desirable for the development of power. In fact, power plants are located as follows:—At Disraeli, St. Francis Water Power Company, 40 feet head; Disraeli, the Champoux Company, 20 feet head; Weedon, City of Sherbrooke, 30 feet head; East Angus, the Brompton Pulp & Paper Co., 55 feet head; Bromptonville, the Brompton Pulp & Paper Co., 30 feet head; Windsor Mills, Canada Paper Company, Ltd., 16 feet head; Drummondville, Southern Canada Power Co., Ltd., 30 feet head.

By the construction of a dam at the outlet of lake St. Francois, a complete control of the water running from a basin of 472 square miles has been secured, and this water is being evenly distributed throughout the year at the rate of six hundred cubic feet per second. The minimum flow from this lake, under natural conditions, has been measured as one hundred second-feet. The minimum flow from this source has therefore been increased by five hundred second-feet.

Lake Aylmer is located immediately below the town of Disraeli at an altitude of practically one hundred feet below



La Loutre Dam, Upper Waters of River St. Maurice, Champlain Co., Quebec.



General View of La Loutre Dam, St. Maurice River.

that of lake St. Francois. Its drainage area is one hundred and thirty-five square miles, and its run-off is controlled by a dam at the outlet of the lake near the village of St. Gerard. It has been calculated that this lake will supply one hundred and fifty second-feet above its natural minimum flow.

The dam at lake St. Francois may raise the water twenty-seven feet above the natural low water, and the dam at St. Gerard may raise the water twelve feet above natural low water.

The storage capacity of the reservoir created by lake St. Francois dam is four hundred and thirty-eight square miles, or 12.2 billion cubic feet. The reservoir is filled up in the spring.

The cost of the storage scheme on river St. Francois amounts to \$700,000. Of this capital cost, the power owners who reap benefits from the storage have been called upon to pay a yearly rental which covers the interest charges, the sinking fund within a period of thirty years, the cost of maintenance and repairs and a reasonable profit. The amount necessary to cover the above-mentioned items is \$59,000. The benefits to be derived by each company using the storage water could not be ascertained as no records of the flow of the river were available, and any figures as to additional power due to the storage could only be approximate. In the case of the St. Maurice river, it was different; the calculations were made from complete data. But, in this case, to avoid any discussion or litigation as to the benefits derived, it was decided to divide the charges according to the head under which the water was used and the increase in the minimum discharge. This is called the "second-foot-head-method." It is used by the Wisconsin Valley Improvement Company to distribute the storage charges between the various power companies on the Wisconsin river. For example: the storage reservoir of lake St. Francois supplies five hundred second-feet above the natural minimum flow. This water is used by the St. Francis Hydraulic Company under a head of forty feet. The charge of this company would be calculated as being $500 \times$

$40 = 20,000$ second-foot head. The companies which have their power plants located below lake Aylmer receive an additional 150 second-feet and, in the case of the Brompton Pulp & Paper Company, which used that water over a head of 85 feet, the proportion would be $650 \times 85 = 55,250$ second-foot-head. The rate was therefore fixed at fifty cents per second-foot-head. Some of the plant owners have signed contracts and others have accepted the tariff just mentioned.

River St. Anne (of Beupre)

A smaller storage scheme has also been carried out in the watershed of the river St. Anne of Beupre, to increase the minimum flow at St. Ferreol, Seven Falls, where the Laurentian Power Company operates a plant under a head of four hundred and ten feet. The minimum natural flow of the river at that point was one hundred and sixty-five second-feet, and it is hoped to raise that minimum to two hundred and over.

This storage is provided by a dam at the outlet of lake Brule and gives control of the run-off from a watershed of twelve square miles only.

The Commission is contemplating additional storage on this river.

Further Activities

The other activities of the Quebec Streams Commission have been a complete study of the valley of the Chaudiere River, in the Beauce District, where disastrous floods occur occasionally and, more particularly, on the 31st of July, 1917, when, after very heavy rains, the water rose thirty-two feet in less than twenty-four hours. The Commission has been called upon to make a full report on the possible prevention of such disasters. Said report is now being prepared.

The Commission has also made a complete study of the possibilities of lake St. John as a storage reservoir. It was found that by a suitable control at the outlet of this lake, it was possible to keep the minimum flow of the Saguenay river to 22,000 second-feet without causing any damage to



Hollow Concrete Dam at Outlet of Lake St. Francis.

lands, wharves, etc., around the lake. Such a storage would make possible the development of 600,000 horse-power on the river Saguenay, above the town of Jonquieres. Lake St. John has an area of three hundred and fifty square miles and drains a watershed of thirty thousand square miles.

The Commission has equally made a complete study of the possibilities of creating a storage reservoir in lake Kenogami. This lake has an area of twelve square miles and a partial regulation is now taking place under control of the Chicoutimi Pulp Company. Lake Kenogami has two outlets: one into the river Chicoutimi about ten miles from Kenogami; the other outlet is through the river aux Sables which flows into the Saguenay at Kenogami. Lake Kenogami is about four hundred and seventy-five feet above the level of the Saguenay river. Its two outlets are well provided with falls and rapids. On the Chicoutimi river, water powers have been developed and are being used by the Chicoutimi Pulp Company to operate their large pulp mills. On the river aux Sables Price Brothers Limited have developed water power for the operation of their pulp and paper mills at Kenogami. The cost of storage into lake Kenogami was estimated at \$1,800,000 in 1916, but, under present conditions, it is believed that its cost would be \$3,000,000. The question as to whether this work should be carried out or not is now under consideration.

Amongst the other activities of the Quebec Streams Commission, there is the study of a certain number of undevel-

oped water-powers, namely: on the St. Maurice, on the St. Francois, on rivers Bell, Megiskan and Harricana in the Abitibi district, and on the Manicouagan, aux Outardes, Betsiamites (Bersimis), Les Escoumains, Franquelin and Natashquan rivers on the north shore of the St. Lawrence.

The Commission has also started systematic gaugings of a certain number of rivers in the province. This field of investigation is being enlarged every year, and it is the aim of the Commission to extend it over the whole of the province.

Results From Commission's Work

Beneficial results have been already obtained through the water conservation policy inaugurated by the Government. Very important industries have located in the St. Maurice Valley, namely: at Shawinigan and Three Rivers, owing to the large increase in the power possibilities of this valley. On the river St. Francois, plants are now being constructed at Drummondville, Richmond and Sherbrooke, which necessitates the investment of several million dollars and where two or three thousand hands will be given employment.

As mentioned above, the money invested by the province in conservation of water is a very profitable investment, not only through the charges which are made to the power companies using the water, but through the industrial prosperity which the said policy will contribute largely to bring here.

Regulating Use of Electric Energy

Not only does the Province of Quebec co-operate with development of water power resources, but a watchful care is maintained over the various uses to which electricity is applied. Salutory rules and regulations develop and protect at the same time

By LOUIS GUYON *

The loss from fire in Canada is deplorable. Much of the destruction is preventable if people would only take ordinary precautions, but we have grown careless and do not count the cost either of property or life where fire hazards are concerned. The public needs educating along the lines of taking more precautions—of being more alive to the immense economic losses, which, in the main, could be avoided.

While education will accomplish a great deal, the Province of Quebec Government believe that legislation can also render material assistance in preventing fires. The Government have, indeed, been pioneers in fire prevention in relation to forests. A further step has now been taken, having reference to electrical and heating installations. The main principle of an Act for the "Protection of Public Buildings against fire" is that the installations shall be made by competent workmen. It will be noted from the provisions of the Act, extracts from which are given below, that all plans have to be submitted to the Chief Inspector of Industrial Establishments and Public Buildings; the contractors and employees have to be licensed; and that for the purposes of carrying out the Act, a Board of Examiners is provided for.

It was the original intention of the Government to put the law into effect during May, but owing to certain unforeseen circumstances, its application has been postponed prob-

ably until July, by which time the Government will have appointed inspectors to supplement the work of the Examining Board, which consists of Messrs. J. N. Mochon, manager secretary of the Electrical Co-operative Association, Province of Quebec; N. S. Walsh, of A. A. Giddings & Co., Ltd., Montreal; and J. B. Dorais, superintendent at Levis of the Quebec Railway, Light, Heat and Power Company, Limited.

Installation of Electrical and Heating Systems

3789b. Counting from the 1st of May, 1921, every new installation, either for light, heat or motive power, as well as every heating system in public buildings, must be submitted for the approval of the chief inspector of industrial establishments and public buildings, and to the examiners appointed for that purpose.

3789c. Except in the cases hereinafter provided for, no person or company shall, after the 1st of May, 1921, carry on any business, undertake or work at the installation of wires, conduits or apparatus for the transmission of electricity, for producing light, heat or motive power, in this Province, as a contractor or as a journeyman electrician, unless such person or company has obtained a license from the examiners appointed for that purpose.

3789d. Every installation of any kind of heating system in a public building already installed or which may hereafter be installed, must be approved by one of the inspectors of public buildings, who shall give a certificate to that effect constantly kept posted up in a place indicated by the inspector.

3789e. No electrical installation in a public building in the Province, for the transmission of light, motive power, or heat, can be made or altered otherwise than by a person

* Deputy Minister of Labor and Chief Inspector of Factories and Buildings, Province of Quebec

or under the supervision of a person duly authorized and having a license to that effect.

3789f. The Lieutenant-Governor in Council may prescribe the conditions under which the license provided for by article 3789p shall be issued, as well as its duration and the fee to be exacted. He may also prescribe such conditions as he may deem just and reasonable, regarding the installation of a heating system in any public building, as well as the conditions under which the certificate provided for by article 3789d shall be issued, as well as its duration and the fee to be exacted.

3789g. The chief inspector of public buildings may, with the approval of the Minister of Public Works and Labor, declare any electric installation or any heating system already in a public building, to be defective, and order the necessary alterations to be made, and, in default of compliance with the said inspector's orders to that effect, the owner shall be liable to the penalties provided by articles 3782 and 3783.

Examiners

3789h. 1. The Minister of Public Works and Labor may appoint a board of examiners consisting of three members, who must be competent electricians, not under twenty-five years of age, and having at least five years experience as journeymen electricians. The persons so appointed must be able to speak and write French and English correctly.

2. The duties of such officers shall be as follows:

- a. to examine all electric and heating installations submitted to them;
- b. to examine all those desiring to become electricians, to issue certificates of competency and grant licenses;
- c. to hold examinations in such places as the Minister of Public Works and Labor may be pleased to select;
- d. to draw up a programme for the examinations, prepare forms and other documents for the same, collect fees, keep registers and facilitate the inspectors' work as much as possible.

They shall keep, in the archives of their offices, a copy of every license and certificate given by them, and draw up reports on the operations of their office whenever called upon by the Minister so to do.

3789i. No apprentice, laborer or person not provided with a certificate of competency, shall have the right to put in electric installations except as assistant under the immediate direction of a journeyman electrician with a license.

3789j. Every company, association or person whose place of business is outside the Province of Quebec, and who wishes to undertake or furnish electric installation, under the provisions of this section, must appear before the board of examiners and obtain a temporary license allowing him to continue his operations during the time required for completing his contract. Such license shall expire as soon as the work is finished.

3789k. No certificate or license issued under this act or the regulations, may be transferred or conveyed; and every such license and certificate may be suspended or cancelled by the board of examiners for sufficient reasons. Such suspension or cancellation shall, however, be subject to appeal to the Minister of Public Works and Labor, and his decision shall be final.

3789l. Every license issued to electrical installation companies or contractors, must be posted up in the offices of such contractors or companies, and every journeyman electrician, moving-picture operator or holder of a special license, must always carry a copy of his certificate on his person. Any omission to post up the license or neglect to carry the certificate required by these regulations shall be prima facie proof of lack of qualification.

3789m. Proof of the fact that a contractor, company, or association employs an unlicensed person for an electrical installation, or that such installation is done contrary to the regulations adopted to that end, or that the license was obtained under false representations, shall be considered sufficient cause, under the provisions of article 3789k, for cancelling the license of such contractor, company, corporation or association.

3789n. Certificates shall be issued for the year and must be renewed yearly between the first and fifteenth of May of each year.

Licenses of contractors, companies, corporations or associations may be issued at any time, but ten days' notice must be given to the examiners.

3789o. Certificates shall be given for the year and be

renewed annually between the 1st of May and the 1st of October of each year. The rates for fees, as regards the examination of the installations mentioned in article 3789b, shall be based on the percentage of the value of the installation, to wit: one-half of one per cent, with a minimum of ten dollars. The rate for special licenses issued to non-resident contractors doing business within this Province, shall be one per cent on the value of the contract, with a minimum of fifty dollars.

Certificate and Licenses

3789p. 1. Five license forms shall be issued, designated as follows:

License A, which may be issued to any person who has satisfactorily passed the examination prescribed for journeymen electricians, and has filed an application to be registered as a contractor or master electrician in the examiners' office and paid the fee prescribed by this section;

License B, which may be granted to any company, association, corporation or firm doing or wishing to do business as contractor for electrical installation, provided one of the members of the said association, company, corporation or firm, or at least one person in its employ, holds a certificate of journeyman electrician given by the examiners, and that the fee for the license has been paid;

License C, which may be given to a journeyman electrician, having at least five years experience, and who, after passing his examination successfully and complying in every respect with the prescriptions contained in the forms prepared by the examiners, has paid the fee prescribed by this section;

License D, which is that authorizing a person to take charge of a moving-picture machine. Every person applying for this license must be not less than eighteen years old, pass an examination before the examiners, obtain a certificate of competency and pay the fee hereinafter prescribed.

The operator is specially required to keep a copy of the license granted him posted up in a conspicuous place;

License E, which is the special license authorizing a person with a knowledge of electricity and employed in a public building, to do work in connection with the repair and maintenance of electrical installations in the said public building.

The person applying for such special license must pass an examination before the board of examiners.

2. Every person operating a machine driven by electricity, such as winches, derricks, travelling cranes, or any other machines more or less dangerous to the operators, workmen or the public, must obtain a license.

Fees

3789q. 1. Every corporation, association, company, firm or contractor for electrical installations for the production of light, heat or motive power, must pay a fee of twenty-five dollars per annum for its license.

2. For a temporary license, a fee of fifty dollars shall be paid to the board of examiners.

3. For every examination certificate issued by the examiners for a journeyman electrician, a fee of five dollars per annum and two dollars for every renewal.

4. For every special certificate or examination certificate of an operator of a moving-picture machine, the fee shall be three dollars, and one dollar shall be paid for the renewal of either certificate.

3789r. The examination fee for every journeyman wishing to obtain a diploma permitting him to inspect electrical installations and everything connected with apparatus used in this branch of industry, either for his employer or in the service of the provincial government, shall be twenty-five dollars, and five dollars for the renewal of the license.

3789s. The fees and fines collected shall be remitted to the Provincial Treasurer.

3789t. 1. This section and the regulations enacted thereunder shall not affect the work in electrical stations or their branches where electric power is generated, either by a public service corporation or a municipal service, where the work is done by the employees under the control and direction of the officers of the said corporation or municipal service.

2. The following are excluded from the effects of this section and of the regulation:

- (a) telephone and telegraph installations where power is supplied by primary galvanic wires;

(b) locomotives, cars and tramway systems operated by a public service;

(c) the installations of arc lamps, used for lighting streets and public roads and operated by a public service;

(d) the lights and glass bulbs used in private houses, and the installation or preparation of carbons in arc lights in public streets.

Examinations

3789u. Every person wishing to obtain a certificate either as a journeyman electrician, an operator of a moving-picture machine, special operator, or as being in charge of hoisting apparatus as electrician, must send application to the board of examiners on a form supplied to him for the purpose. He must give information regarding the duration of his service in his present employ and also give the board of examiners satisfactory information regarding his conduct and sobriety.

3789v. The code known as the "National Electric Code" shall serve as a basis in drafting the examination programs, as well as the forms and questionnaires to be used by the examiners upon the examination of candidates for certificates as electricians;

The examiners may also require from the candidates a practical as well as a theoretical demonstration in installation of electric power in the buildings mentioned in this section.

3789w. Every stationary engineer holding a first or second class diploma has the right to do improvement and repair work in electrical apparatus, but only in the workshops or factory where he is regularly employed.

Penalties

3789x. The following are liable to the penalties provided by article 3782, namely: every firm, company, corporation or person contracting for electrical installation work for the production of light, heat or motive power, without a license or without being under the supervision of an electrician holding a diploma under this section or the regulations.

3789y. The following shall be liable to the penalty provided by article 3782, namely: every journeyman electrician, operator of a moving-picture machine, as well as every person in charge of repair or maintenance work in the build-

ings mentioned in this section comprised under the name of "Special License E", as well as every person in charge of the operating of electric machinery mentioned in the regulations, who neglects or refuses to pass his examination before the examiners, or who, without holding the certificate required by law and by the regulations, contracts for electrical work either in connection with the installation of wires or other electrical apparatus, or for the operation of the said electrical machines.

3789z. In order to ensure the observance of the law and regulations regarding electrical and heating installations, and to ascertain whether the persons mentioned in the act hold the licenses or certificates and comply with the law and by-laws, there may be added to the staff of the department of inspection of industrial establishments and public buildings, a number of inspectors duly qualified as journeymen electricians, whose work shall consist in making inspections in all the public buildings of the Province, in making the law known to the interested parties and reporting to the chief-inspector and the examiners whatever infringements they may observe.

3789zd. The fees and fines imposed by the courts for any infringements of the law or regulations regarding electricians, shall be collected by the chief-inspector and be paid to the Provincial Treasurer.

Awarded Substantial Contracts

Messrs. Philip Lahee & Co., 3 St. Nicholas Street, have secured the contract for electrical work on an extension being built to the Library Building, Sherbrooke Street West, at an approximate cost of \$200,000. Also on a Pathological building being erected for McGill University at a cost of \$460,000.

Messrs. Booth Bros., 316 Melrose Avenue, have been awarded the contract for electrical work on a bank building at 112 St. James Street, owned by the Banque de Hochelaga, which is undergoing alterations at an estimated cost of \$100,000. Also for electrical work on a Sunday School building being erected on Grand Avenue for Kensington Church.



Laurentide Power House at Grand Mere, Quebec—Shawinigan Water & Power Co.

Quebec Power Developments are Among Largest in the World

Previous Articles have told of the Waterpower Resources of the Province of Quebec, their Regulation and Use. The following pages tell, briefly enough, of the wonderful work that has already been done in the way of harnessing these Powers and utilizing Electric Energy to Make Quebec Synonymous with Ideal Industrial Facilities

Shawinigan Water & Power Co.

By R. J. BEAUMONT*

The beauty and grandeur of Shawinigan Falls had long been a matter of talk and wonderment, but it is only within recent years that their utilitarian possibilities have attracted attention. Twenty years ago the St. Maurice Valley district was a negligible quantity as a manufacturing centre and the waters of Shawinigan Falls represented a waste of millions of dollars annually. In the intervening period the Falls have been harnessed and the district has advanced industrially by leaps and bounds. Cheap electric power in abundant quantities is the surest tonic for industry and nowhere has this proven more truly the case than in this district. The Shawinigan Water & Power Company by their energy, foresight and courage have transformed a wilderness into a hive of activity, notable for the magnitude of its hydro-electric development, the extent and variety of the industries established, the modernity of its equipment, the broad field of its influence and the efficiency of its organization. Throughout, the different industries have been admirably chosen to supplement one another, so that development has been uniform. For these reasons the Shawinigan Falls district may be truly looked upon as one of the wonder places of this continent.

The energy distributed by this company is derived mainly from two sources—first, the Shawinigan Falls, situated on the St. Maurice River some 100 miles from Montreal, and second, from Grand Mere Falls, some eight miles further up the river.

The entire water rights at Shawinigan Falls are owned by this company and an aggregate development of 200,000 h.p. is obtained. The greater part of the water is used to operate the company's two hydro-electric plants, which have a total capacity of 155,000 h.p. The remainder of the water is sold to two local enterprises. An extension of the power plants is now in course of construction which will eventually provide for three 40,000 kv.a. units.

Brief Description of Shawinigan Development

The other chief source of power, Grand Mere Falls, was originally developed by the Laurentide Company; but, by arrangement, the operation of this plant has been placed in the hands of the Shawinigan Water & Power Company. At this point 160,000 horse power has been developed, part of which is used locally in the paper industry. Some 100,000 horse power, however, is taken by the Shawinigan Company. It is transmitted first to Shawinigan Falls by a 100,000 volt steel tower line and thence distributed over their extensive system. The Shawinigan Company also own a third source of power at Gres Falls, some five miles below Shawinigan Falls.

*Manager subsidiary companies

The two power houses at Shawinigan Falls are located about 600 feet apart on the bank of the St. Maurice near the gorge. The minimum flow of the river now approximates to 16,000 c.f.s., having been largely increased by the completion of conservation storage works at La Loutre by the Quebec Streams Commission. A head of about 150 feet is obtained. The dam is 1100 feet long and consists of 20 Stoney sluice-gates, each with a clear opening of 40 feet and a height of 18 feet. The gates are operated electrically by means of travelling hoists. Two regulating gates of the same type, enclosed in a building equipped with a heating system, are provided to regulate excess flow during the cold season.

The original power development included a canal 1,000 feet long, excavated in the rock, a bulkhead with six penstocks and power house No. 1. In the second development use is made of the same canal, which has been enlarged at the end to a forebay closed up by a new bulkhead constructed at an angle of about 30 degrees, with the old bulkhead and adjoining it. Each section of the bulkhead has an appropriate gatehouse controlling the flow of water at the head of the penstocks.

The main headgate is a steel structure 13 feet wide and 14½ feet high, and is raised and lowered by means of a double screw mechanism operated by bevel gears driven by an electric motor, which is provided with automatic limit switches and signal lamps. The unusual pains that have been taken to avoid trouble are demonstrated in the gatehouse, where a complete electrical heating system has been established in order to check the accumulation of ice on the racks and the freezing up of the gate mechanism. Air ducts are located in the floor of the gatehouse and openings are provided so that air can be discharged in many places. The effect of the system has been to eliminate the old trouble of ice sticking to the rack bars, and as there is no formation around the gates, no difficulty has been experienced in operating the headgates in the most severe weather.

Power House No. 1

Power House No. 1 was first operated in 1902. It is supplied with water by six steel penstocks, each 550 feet long; two of these are 12 feet and the remainder are 9 feet in diameter. All the energy is produced in this plant at 2,200 volts, 30 cycles by 2-phase generators. Voltages of 50,000 and 25,000 are used for transmission purposes; the latter voltage is used to supply some 22,000 kw. to the local carbide works.

Power House No. 2

The second development, power house No. 2, furnished an interesting illustration of the progress made in hydro-electric power developments and transmission, embodying as it does, many improvements in the hydraulic and electric fields. This plant is notably large, being designed for a final output of 100,000 horse power and transmission at 100,000 volts. Designed to give continuous service it is, as

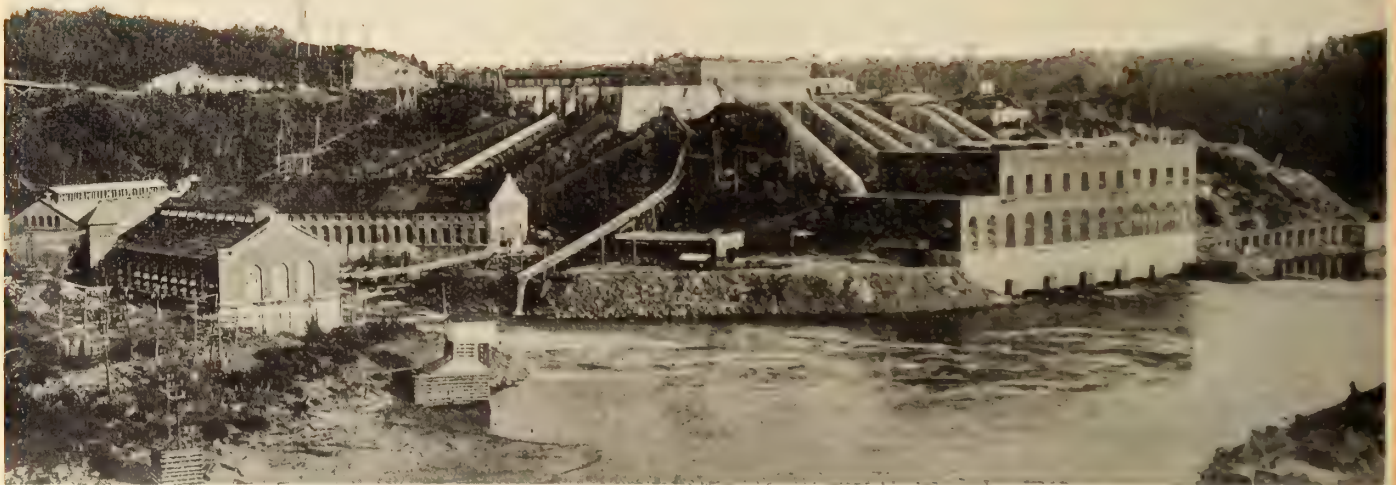
far as possible, fireproof in construction and has been so arranged that the large units and their connections are well separated from each other and so isolated that even in case of accident the station can be kept operating under almost any possible circumstances. Each unit is complete in itself and independent, straight through from the bulkhead, penstock, turbines, generator, transformer, transmission line and stepdown transformer at Montreal.

The turbines are of twin spiral case type and are rated at 18,500 horse power at 225 r.p.m., with an effective head of 145 feet. Each turbine is equipped with an automatic governor and also an emergency hand control. An automatic relief valve is provided, which operates in such a way that the turbine gates cannot close suddenly without opening

board is located on an enclosed gallery at the end of the power house and is of the benchboard type with dummy buses. Indicating instruments are carried on pedestals in front of each benchboard and recording instruments are fixed on a panel at the back of the benchboard.

The main turbines and exciter turbines in the power house were built by the I. P. Morris Company, Philadelphia, Pa.; the generators and exciters by the Canadian Westinghouse Company, Hamilton, Ont., and the step-up and step-down transformers by the General Electric Company, Schenectady, N.Y.

The complete hydro-electric plant was designed and built by the engineering staff of the Shawinigan Water & Power Company.



Power Plant of Shawinigan Water & Power Co. at Shawinigan Falls.

the valve; when the relief valve is so open it closes gradually at such time as prevents a rise of pressure in the penstock exceeding 25 per cent. of the normal pressure.

Each turbine is coupled to a 3-phase, 60-cycle, 14,000 kv.a. generator. The generators are connected directly to a 3-phase, 14,000 kv.a. oil-insulated, water-cooled transformer which raises the voltage from 6,600 to 100,000 volts.

The whole of the high tension wiring is laid out in such a way as to afford the greatest safety for the operating force and to eliminate as much as possible mistakes in the operation of disconnecting switches. These switches are operated mechanically by means of a shaft, gears and chain, from outside the room in which they are located. All disconnecting switches on the high tension and low tension bus bars are equipped with a telltale lamp system indicating the "open" and "closed" position of the switches, on the benchboard in the switchboard room. The main switch-

The development consists of a concrete dam located along the crest of the Grand Mere Falls. Sluice gates are used to control the water levels. The power house building consists of a steel frame, with brick walls, standing on a concrete substructure. It is completely equipped with all the machinery and apparatus for eight waterwheel units. The waterwheels and auxiliary units were manufactured and installed by the I. P. Morris Company. A head of 78 feet gives a rating of 20,000 horse power on the turbines, which operate at a speed of 120 r.p.m. The six generators, which were supplied by the Canadian Westinghouse Company, are vertical units of 16,400 kv.a., 3-phase, operating at 6,600 volts, 60 cycles.

Some conception of the vast network of power lines maintained by the company may be obtained from the map shown herewith. This network is made up of transmission lines and in this connection it may be said that the

linking together in 1903 of the power from Lachine Rapids, Montreal Light, Heat and Power Co. and Shawinigan Falls represented the first time in history that three great power stations operated by different types of prime movers had been successfully linked together.

The lines from Shawinigan Falls to Montreal may be considered as the central artery of the great system. The steel tower line is 87 miles long with 867 steel towers and carries two 100,000 volt lines having a capacity of 20,000 kw. each. The three wires of each circuit are carried on suspension insulators and consist of 19-strand aluminum cable of 250,000 cir. mil. For the long spans across the rivers No. 000 B & S copper cable has been used to decrease the sag. The standard tower spacing is 520 feet, but there are some river spans up to 1400 feet, necessitating special high towers. The standard tower has a total height of 70 feet 7 inches and at the base is 19 feet by 19 feet square. Every tenth tower is a strain tower—these are a little shorter but otherwise of the same general dimensions as the light towers; they weigh 6,200 lbs. and the standard light section towers weigh 4,800 lbs. The strain towers are designed to stand a breast pull of 30,000 lbs. and the light towers a pull of 15,000 lbs. Some special towers have been used for long spans and large angles. All towers are anchored to concrete foundations. A similar tower line of two circuits is now nearing completion.

The 50,000 volt lines have a total length of about 800 miles extending in three directions—first to Montreal, second to Quebec, and third to Three Rivers and across the St. Lawrence River to Victoriaville and the asbestos mining district, with another branch from Victoriaville to Windsor Mills and Sherbrooke.

Sub-Stations

The most important sub-station of the Shawinigan company is located in Montreal, at the end of the two transmission lines; the tension is here reduced to 12,500 volts. The first floor of the station is occupied on one side by transformers and electrolytic arrestors, and on the other side by 12,000 volt buses and disconnecting switches for the feeders.

The main operating room is on the second floor. From the benchboard here the operator controls the transformer circuit, the 100,000 volt oil switches on the transmission line and transformers. The quantity of power supplied

to outgoing feeders is shown by indicating and graphic record meters located on totalizing panels behind the operator.

Other main sub-stations are located at Three Rivers, Joliette, St. Casimir, Quebec, Victoriaville and Thetford, with smaller sub-stations at numerous points serving towns, groups of villages and also large industries as requirements need.

Summary of Power Developments

Summarizing the installed capacity in electric generating equipment owned or controlled by the Shawinigan Company is as follows:— Shawinigan plant No. 1, 58,500 h.p.; Shawinigan plant No. 2, 100,000 h.p.; Laurentide (120,000 h.p. installed), 82,500 h.p.; St. Narcisse, 1,200 h.p.; steam plant of Quebec City Public Service Corporation, 4,000 h.p.; total electric capacity, 246,200 h.p.

In addition, the Shawinigan Company supplies hydraulic power to the amount of 50,000 h.p. at Shawinigan Falls, thus giving a total power development, owned and controlled by the company, of 296,200 h.p.

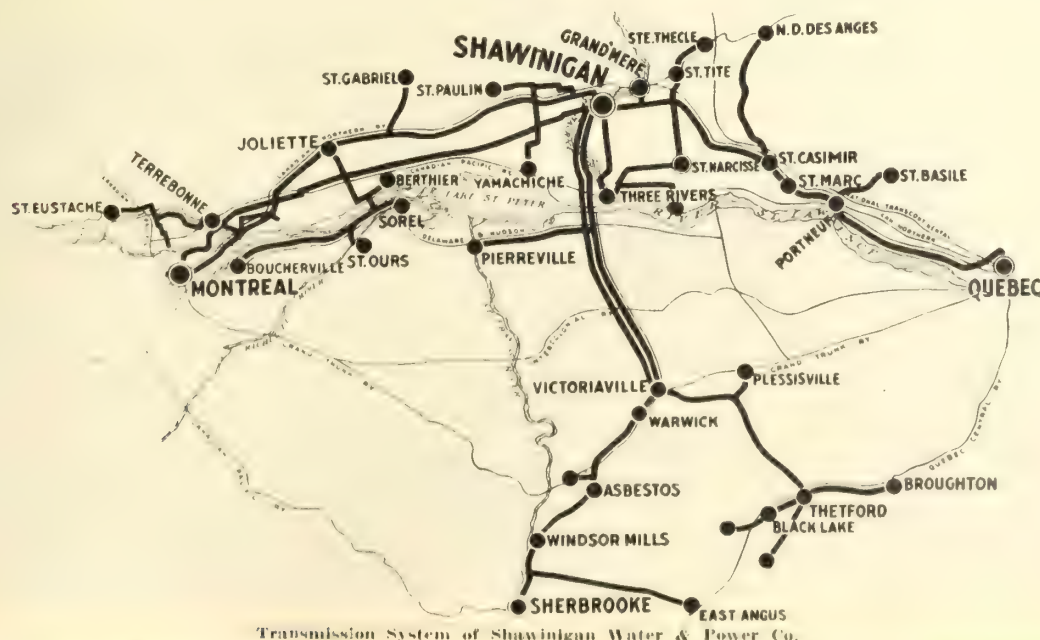
Summarizing the power situation, we find:— Electric equipment now installed, 246,200 h.p.; hydraulic power supplied, 50,000 h.p.; power used by Laurentide Co., 37,500 h.p.; future provision at Laurentide Co., 60,000 h.p.; future additional development at Shawinigan Falls, 100,000 h.p.; future development at Gres Falls, 150,000 h.p.; giving a total of 643,700 h.p., of which 333,700 h.p. is now installed as hydraulic or electric power, leaving 310,000 h.p. for future development.

Use of Power

Out of the total power controlled by the Shawinigan Water & Power Co., more than 130,000 h.p. is utilized in the industries located at Shawinigan Falls. The Northern Aluminum Co. uses for its own purposes direct current generated in its own power houses, and besides takes electric current from the No. 1 power house of the Shawinigan Water & Power Co., making a total power consumption of about 50,000 h.p.

The Belgium Industrial Co., whose mill is built on the banks of the Little Shawinigan River, owns large tracts of timber lands on the St. Maurice River and its tributaries, from which the wood used in producing pulp and paper is cut and floated down the river to the mill.

Other power users are the Canada Carbide Co., Can-



Transmission System of Shawinigan Water & Power Co.

adian Electro Products Co., Canadian Electrode Co., Canadian Carborundum Co., Prest-O-Lite Co., Shawinigan Foundries Ltd., Shawinigan Cotton Co. and the Eagle Knitting Co.

It has been the policy of the Shawinigan Water & Power Co. to sell power wholesale to distributing companies, either subsidiaries of the Shawinigan Water & Power Co. or companies in which it is interested. The following electric distributing companies are owned or controlled by the Shawinigan Water & Power Co.:—North Shore Power Co., Electric Service Corporation, Laval Electric Co., Continental Heat & Light Co., Public Service Corporation of Quebec, Three Rivers Traction Co.

A brief resume of the operations of the various subsidiaries follows:—

Laval Electric Company

The Laval Electric Co. obtains power from the Shawinigan Water & Power Co. through a main sub-station at Charlemagne. Distribution is made to a number of towns and villages through about 48 miles of transmission line. The system runs along the north shore of the St. Lawrence River, north to the island of Montreal, and extends from L'Assomption to St. Eustache. The towns of Joliette and St. Gabriel de Brandon are also served from sub-stations at Joliette and St. Norbert.

Public Service Corporation of Quebec

This corporation distributes energy in Quebec City. Three 1,000 kw. station transformers are used to step the voltage down from 60,000 to 2,300 volts.

An auxiliary steam plant is maintained, but is used in emergencies only. This plant is located in a brick and concrete building and contains four 250 h.p. water tube boilers and three steam turbine units, two of which are of 750 kw. and one of 1000 kw. capacity. This plant was constructed in 1912.

The distribution is carried out over 75 miles of streets and embraces 6½ miles of underground wiring. For street

lighting, luminous arc and 60 c.p. and 80 c.p. incandescent lamps are used.

Three Rivers Traction Co.

The line of the Three Rivers Traction Co. was opened towards the end of 1915. Beginning operations at a time when electric railway equipment had arrived at an advanced stage of development, this company has not been hampered with quantities of old equipment. The company's cars are of the latest one-man, pay-as-you-enter type, seating about thirty people.

North Shore Power Co.

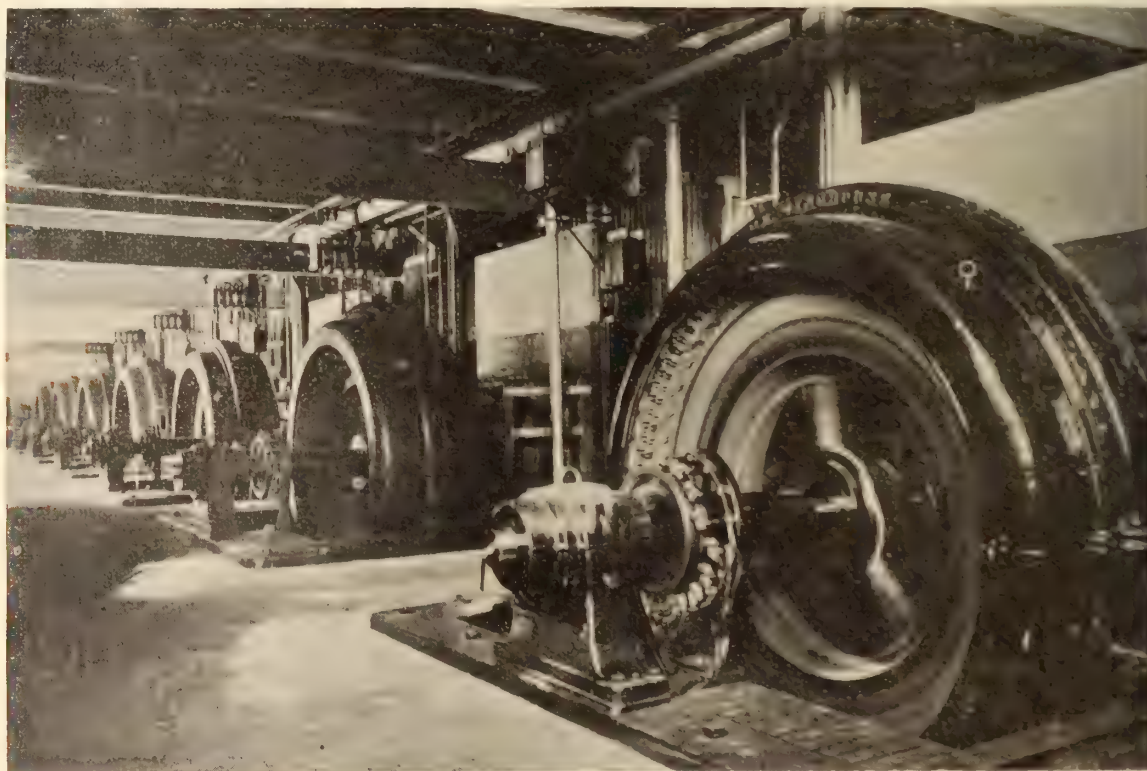
The hydro-electric plant of this company is located on the Batiscan River at St. Narcisse and consists of a concrete dam 150 feet long by 10 feet high, with a 6-foot steel penstock, 100 feet long, leading to a stone power house. Energy is generated at 2200 volts, 60 cycles, by turbine driven generators of an aggregate capacity of 1050 kw. With the addition of power supplied by the Shawinigan Water & Power Co., the energy requirements of Three Rivers, Ste. Angele, Cap Madeleine, Champlain, Ste. Geneve, St. Maurice, St. Narcisse and St. Stanislas are taken care of.

Continental Heat & Light Co.

This company distributes a fairly large amount of power, most of which is used in the asbestos industry, supplying energy to the towns of Asbestos, Black Lake, East Broughton, Plessisville, Thetford, Victoriaville, Windsor Mills, Bromptonville and Sherbrooke. Sub-stations are maintained in these places for local distribution.

Through these various companies the Shawinigan Co. supplies electric light and power to 144 cities and towns, of a total population of 1,500,000, distributed over an area of 20,000 square miles.

The president of the Shawinigan Water & Power Co. is Mr. J. E. Aldred; Mr. Julian C. Smith is vice-president and general manager; Mr. W. S. Hart, treasurer; Mr. James Wilson, secretary.



Grinders of Pulp Mill at Laurentide Company.

Montreal Light, Heat and Power Consolidated

Five Sources of Power — Own and Operate four Hydro-electric Generating Plants — Cedars Rapids, the newest, one of the largest on the Continent — Power Saturation in Montreal Area, 750 kw.h. per capita, per annum

This company's system is one of the largest in Canada, the concentration of load, or amount of energy disposed of within a certain area, being greater, probably, than for any other single organization. The company's distribution system is supplied from five hydro-electric plants situated, respectively at Chambly, Lachine Rapids, Soulanges, Cedars Rapids and Shawinigan Falls. The first four are operated under the company's control but, in addition to these, a large amount of power is purchased from the Shawinigan Water & Power Co., whose plant and system are described in a previous article under the heading "Shawinigan Falls." The company distributes over a very wide area. As evidence of the concentration of power used, Mr. R. M. Wilson, chief engineer of the company, recently prepared the following figures:

Philadelphia uses ..	250 kilowatt hours, per capita, per year
New York City ..	450 kilowatt hours, per capita, per year
Buffalo	585 kilowatt hours, per capita, per year
Toronto	700 kilowatt hours, per capita, per year
Montreal	750 kilowatt hours, per capita, per year

The rapid growth of the population of Montreal, and the still greater growth in consumption of electric energy, is shown by the fact that in 1890, with a population of 220,000, only 775 kilowatts were supplied, while in 1920, with a population of 800,000, over 240,000 kilowatts were furnished. The number of kw. hrs. increased from something less than three millions in 1890 to 643 millions in 1920. The generating plants owned and operated by this company may be briefly described as follows:

The Chambly Plant.

This is about 17 miles east of Montreal on the Chambly River. The available head of water is 23 feet. Eight 3,100 horse power turbines are each direct connected by horizontal shafts to eight 2,000 kilowatt, 2-phase, 63 cycle, 2,200 volt, generators. A bank of transformers steps up this voltage from 2,200 volts, 2-phase to 25,000 volts, 3-phase. This plant was installed in 1898.

The Lachine Rapids Plant.

The available head of water for the plant is 14 feet. The plant is approximately 5 miles south-west of Montreal, on the north bank of the St. Lawrence River. Forty-eight vertical shaft turbines of 200 horse power each are geared in sets of six to eight horizontal shaft 750 kilowatt, 3-phase, 63 cycle, 4,400 volt generators. In addition four 1,500 horse power turbines, are each direct connected by vertical shafts to four 1,000 kilowatt, 3 phase, 63 cycle, 12,000 volt generators. Transformers step up the 4,000 volts to 12,000 volts, so that all out-going lines have the latter voltage. This plant was also installed in 1898.

The Soulanges Plant.

This is about 30 miles southwest of Montreal on the north bank of the St. Lawrence River. The water comes from the Soulanges Canal and the available head of water is 50 feet. Three 5,200 horse power, horizontal shaft, turbines are each direct connected to three 3,750 kilowatt, 3-phase, 63 cycle, 4,000 volt generators. Provision is made for a fourth set to



Cedars Rapids Plant—Will ultimately contain 18-10,000 kv.a. units

be installed in the future. Transformers step up the 4,000 volts to 66,000 volts. The plant was installed in 1908.

The Cedars Rapids Plant.

This plant is situated on the St. Lawrence river at Cedars Rapids, which are near the Soulanges plant. It is one of the most modern and, in some respects, is the most unique plant



Interior View Lachine Power House, showing generators

on the Continent. The available head is 30 feet, which it is planned to increase to 32 feet. Twelve units have been completely installed to date, two others are in course of erection and the building is planned for an ultimate installation of 18 units. Operating under a low head, the diameter of the generators is necessarily large; indeed, it is stated that their 37 foot over-all diameter represents the largest frame in use in Canada, and possibly anywhere in the world. The space

between the blades on the water wheel is large enough for a man to walk through.

The turbines have a rated capacity of 10,800 h.p. and are vertical shaft type, direct connected to the generator. These are 10,000 kv. a. capacity, 3 phase, 63 cycle, 66,000 volts, so



Soulanges Generating Plant, Montreal L. H. & P. Consolidated

that the ultimate capacity of this station will be 180,000 kv. a. One of the illustrations herewith shows the plant as it will look when the installation of the balance of the units is completed.

The transformer house is a 4-storey reinforced concrete building, 130 ft. by 220 ft., in which the voltage is stepped up to 66,000 volts for transmission to Montreal, which is 30 miles distant, and to 110,000 volts for transmission to Massena, N. Y., which is 48 miles away.

This company also maintain an auxiliary steam plant in Montreal, consisting of 7,500 h.p. in water tube boilers and 22,000 h.p. in turbo-generators.

Mr. Herbert S. Holt is president of the Company, with Mr. J. S. Norris vice-president and general manager. Mr. R. M. Wilson is chief engineer.

Le Mouvement Educatif pour la Protection des Edifices, Aidé par la Législation

PAR M. LOUIS GUYON

Sous-Ministre du Travail et Inspecteur en Chef des Fabriques et des édifices publics de la Province de Québec.

Les pertes causées par les incendies au Canada s'élèvent à un chiffre très élevé, dont une bonne partie pourrait être évitée avec un peu de soin et de précaution de la part du public; le manque de soin général, toutefois, nous fait oublier les pertes de vie et de propriété en ce qui se rapporte au danger par l'incendie. L'éducation du public sur la question de précautions à prendre s'impose, pour lui faire réaliser les pertes économiques immenses qu'il subit et qui pourraient, pour la plupart, être évitées.

L'éducation peut accomplir beaucoup, mais le Gouvernement de la Province de Québec est d'opinion que beaucoup de bien peut se faire au moyen de législation et ainsi, aider à diminuer les pertes par l'incendie. Le Gouvernement a été un des pionniers dans la question de protection des forêts contre l'incendie et est allé un peu plus loin dans la législation se rapportant aux installations d'éclairage et de pouvoir électrique ainsi que du chauffage; le but principal de l'Acte qui

prévoit à "La protection des édifices publics contre les incendies" est l'assurance que ces installations seront faites par des ouvriers compétents. L'examen de l'Acte ci-dessus laisse voir que les plans doivent être soumis à l'Inspection en chef des établissements industriels et des édifices publics, que les entrepreneurs et les employés soient licenciés, et que, au Bureau d'Examineurs a été formé pour les fins de cet Acte.

Le Gouvernement avait l'intention d'appliquer cette loi au mois de mai, mais son application a été retardée au mois de juillet à cause de circonstances imprévues. Le Gouvernement se propose de nommer alors des inspecteurs pour superviser le travail du Bureau des Examineurs qui se compose comme suit: MM. J. N. Mochon, Administrateur-en-chef, Association Cooperative Electrique, Province de Québec; N. S. Ward, A. A. Giddings & Co. Ltd., Montréal; J. S. Dorais, Surintendant, Quebec Railway, Light, Heat & Power Co. Ltd., Lévis, P. Q.

Montreal Public Service Corporation

A Consolidation of several Pioneer Companies. Provides Montreal Tramways System and many other large customers with Electric Power. Energy from Canadian Light and Power plant on Beauharnois Canal.

The Montreal Public Service Corporation was incorporated in 1908, and is a consolidation of the Saraguay Electric and Water Company, the Dominion Light, Heat and Power Company, and the St. Paul Electric Light and Power Company. It also operates, under lease, the plant and distribution system of the Central Heat, Light and Power Company.

Power is purchased at 44,000 volts from the Canadian Light and Power Company, and delivery is taken at a large and modern terminal station located at Cote St. Paul, at the western limits of the city of Montreal, adjacent to the Lachine Canal. The delivery voltage is stepped down to 13,200 volts and distributed through aerial feeders to ten sub-stations, located at various points on the Island of Montreal.

The general distribution from sub-stations is at 2,200 volts, 3 phase, 60 cycles, and the company has over 250 miles of pole lines and about 20 miles of cable in the municipal conduit system.

The distribution system of the Montreal Public Service Corporation covers the greater part of the Island of Montreal, and extends from the borders of Montreal West to Bout de L'Isle, and from the St. Lawrence River to the Back River (Riviere des Prairies).

The company furnishes the municipal street lighting in the Montreal city wards of Notre Dame de Grace, Cartierville, Ahunstic, Emard, Sault au Recollet, Bordeaux and Rosemount, and in the municipalities of St. Laurent, Montreal North, Pointe aux Trembles, Laval de Montreal, Laval des Rapids, and Bord-a-Plouffe.

The company has a 50-year contract, dating from 1915, with the Montreal Tramways Company, to furnish all the electric power which the Tramways may desire to purchase, and which the Montreal Public Service Corporation may have for sale, and under this contract is now furnishing over 10,000 h.p. to several tramway sub-stations, on the Island of Montreal.

The company has auxiliary steam generating equipment for emergency purposes, aggregating 3,500 h.p. At the present time they have about 15,000 customers connected to these lines, with a combined connected load of over 50,000 h.p.

Among the most important of the customers served by the company may be mentioned the Canadian Car and Foundry Limited (Turcot and Dominion Plants), St. Lawrence Flour Mills Company Limited, Canada Boxboard Company Limited, Swift-Canadian Company Limited, Head Offices of the Bank of Commerce and Molson's Bank, Toronto Bank Building, Corona Hotel, Freeman's Hotel, Princess Theatre, Linton Apartments, Maxwellton Apartments, Southam Building, McIntyre Building, Letendre & Fils, N. G. Valiquette, Dufresne and Locke Limited, etc., etc.

The Canadian Light and Power Company's Plant

The Canadian Light and Power Company has a hydraulic development at St. Timothee, P.Q., on the south shore of the St. Lawrence River, which has been in continuous operation since 1911; this development uses part of the old Beauharnois Canal which runs from Valleyfield, on Lake St. Francis, to Melocheville, on Lake St. Louis, and which canal was built by the Dominion Government in order to permit vessels to pass round the Coteau, Cedars and Cascade rapids of the St. Lawrence River. The opening of the Soulanges Canal in 1901 displaced the Beauharnois Canal, which was ultimately leased to The Canadian Light and Power Company.

The total fall in the St. Lawrence River from Lake St. Francis to Lake St. Louis is about 83 feet, of which 50 feet is used by the St. Timothee development. The Beauharnois Canal, as originally constructed for navigation purposes,



Montreal Public Service Corporation Terminal Station, Montreal.

was designed for vessels of nine foot draught, so that for power purposes it was necessary for The Canadian Light and Power Company to deepen the Canal to 25 feet in order to secure the water for its development. The general plan of the development commenced in 1909 consisted in deepening the Canal, constructing intake and controlling works at the Canal entrance at Valleyfield, removing the old boat lock at Valleyfield, the construction of a forebay and power house at St. Timothee.

The power house was designed for an ultimate installation of ten units each of 7,600 h.p. at 50 foot head, of which four have been installed with the necessary exciters and switching equipment.

The power house building was constructed of stone, concrete and steel, the ends of the building being of temporary character to permit of future extension.

The electrical equipment consists of 4 5,000 k.v.a. generators and 2 250 kw. exciters; current is generated at 2,300 volts, 3 phase, 60 cycles, and stepped up by means of transformers to 44,000 volts, for transmission to Montreal.

The transmission line runs on a 106-foot-wide private right of way, and is approximately 27 miles in length. Standard "A" frame 52-foot steel towers are used, except at crossings over the Beauharnois and Lachine Canals, where special towers of 185 feet in height were necessary, on

insulators arranged in four strings of five insulating units, with equalizing bars; there is also a heavy turnbuckle in each cable with a two-foot adjustment to permit of even sagging of cables. The sag in each of the 1750-foot spans is about 80 feet in each cable.

At Beauharnois, P.Q., the transmission line is tapped and power delivered to the Beauharnois Electric Company, Limited, at 44,000 volts, where about 2,000 h.p. is delivered; the balance of all power generated at St. Timothee is delivered at Montreal where the Montreal Public Service Corporation takes delivery immediately outside its sub-station, also at high tension.

The Beauharnois Electric Co.

The Beauharnois Electric Company, Limited, was incorporated in 1912, and serves the district on the south shore of Lake St. Louis, from the town of Beauharnois eastwards to the boundary line of the Indian Reservation of Caughnawaga. Power is purchased from The Canadian Light and Power Company, delivery being taken at 44,000 volts, at Beauharnois, where there is a sub-station with an installed capacity of 1,800 k.v.a. in step-down transformers.

The general distribution line voltage throughout the district is 6,600 volts, 3 phase, 60 cycles, the voltage being reduced directly from 6,600 volts to 110 volts with ordinary pole type transformers where local connections are required.

In the town of Beauharnois, only, the general distribution voltage is at 2,200 volts.

The company furnishes light and power in the towns of Beauharnois, Lake St. Louis, de Lery, Chateauguay, and in the village of St. Joachim de Chateauguay, and on account of the insistent demand, plans are in preparation for further extensions of the distribution system, to adjacent towns and villages. The territory served is, in some portions, very largely a summer one, although the "all-year" business is growing rapidly.

The largest customer of the company is at Beauharnois, where the entire requirements of the Howard Smith Paper Mills, amounting to about 1,000 h.p., are furnished.

The company furnishes municipal lighting in Beauharnois, Chateauguay and St. Joachim de Chateauguay.

There are over 1,200 customers connected to the company's lines, of which over 5 per cent. are financially interested as bondholders or shareholders, it being the desire of the company to encourage its customers to have a direct interest in its affairs and development by investing in its stock or bonds.

The use of electrical appliances such as electric stoves, ranges, and motor-driven pumps, etc., has become very popular, particularly with summer customers, and nearly 10 per cent. have such equipment installed.

The handy wiring tables and illumination data just issued by the Geo. Cutter Works of the Westinghouse Electric & Mfg. Company at South Bend, Ind., contain much that is of interest to anyone connected with the problems of wiring and lighting offices, factories, etc. Tables of foot candle intensities recommended for different classes of service are included in this booklet, and an interesting discussion of lighting installations is made. Several new devices manufactured by the Westinghouse company are shown in this booklet.

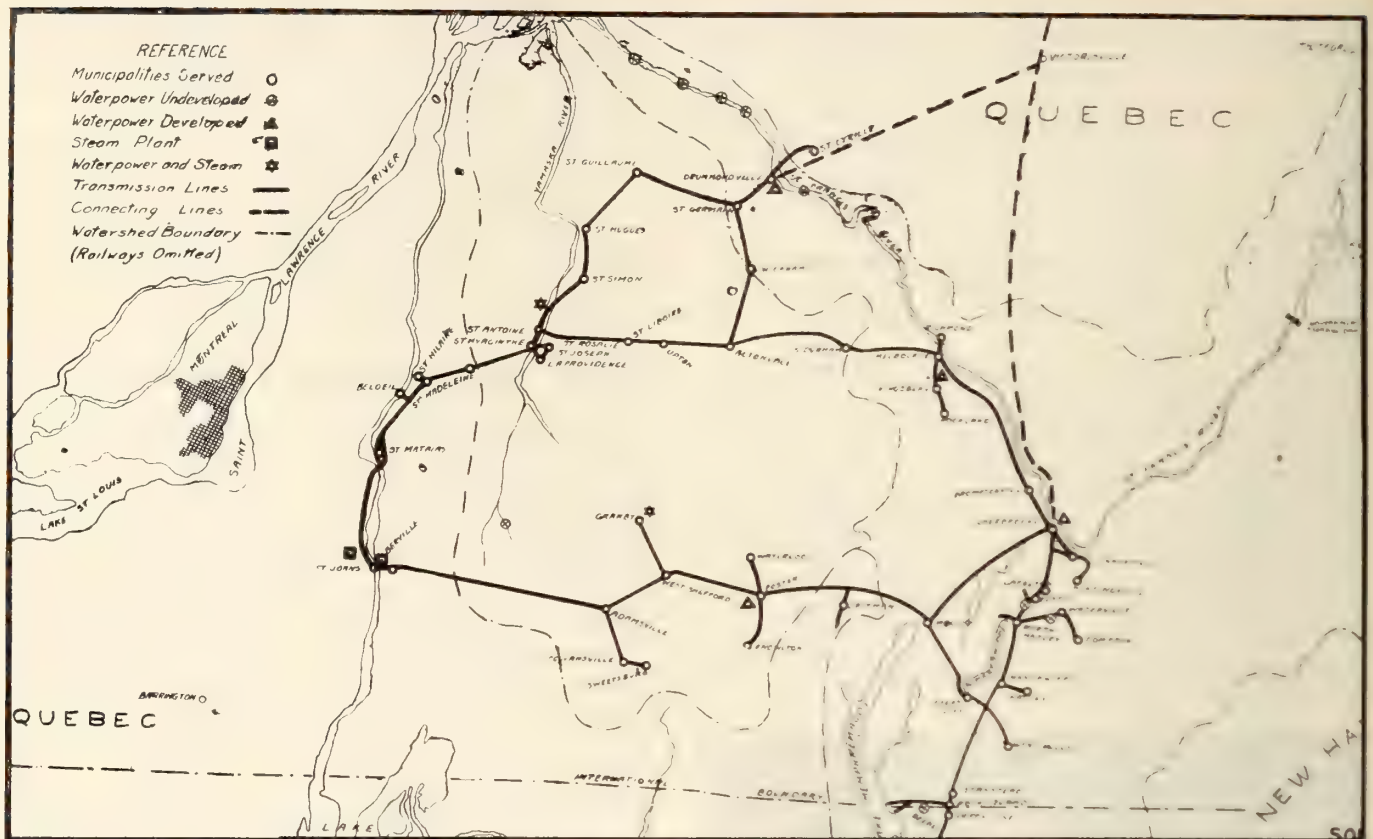
Mr. A. Hall Berry, 71-73 Murray Street, New York city, has been appointed exclusive district sales representative for the Ajax Electric Specialty Company of St. Louis, Mo.



Interior view Canadian Light & Power Company's plant

account of navigation. Each tower supports 2 three-wire circuits of No. 00 B & S. copper cable, with six-foot spacing, insulated with pin type insulators, and the normal distance between towers is about 500 feet. Each tower also supports a No. 4 B. & S. ground wire for lightning protection, and two private telephone wires of No. 5 B. & S. gauge; the ground and telephone lines are solid copper clad steel wire.

There were no great difficulties in the construction of this transmission line, except at the St. Lawrence River, where a crossing was made a few hundred feet below the Canadian Pacific Railway bridge; at this point the river is approximately 3,500 feet wide. At the centre of the river a small shoal was located, the depth of the water over same being about 12 feet deep; massive concrete piers were erected by the aid of wooden caissons, and these piers anchored to rock by means of steel dowels. The conductors consist of copper-clad steel cables 13-16" in diameter, with a breaking strength per cable of 30,000 lbs; the telephone cables are copper-clad steel cables 5-8" in diameter. Each cable is attached to the towers by means of special strain



Transmission System, Southern Canada Power Co.

The Southern Canada Power Company

Serves more than fifty Cities and Towns with Electric Light, Heat and Power, producing a regular hive of Industrial Activity

By J. B. WOODYATT, General Manager.

Industrial development in the Province of Quebec has been coincident with, and in large measure the result of, a cheap and abundant supply of electric power. Industries, in that section of the province known as the Eastern Townships have of late years shown considerable expansion due in a measure to the facilities supplied by the Southern Canada Power Company, Limited, which operates in an area approximately 100 miles east and west, by 60 miles north and south.

This company is a comparatively young one. It was organized in 1913 to acquire six water-powers on the St. Francis River, the franchise of two small companies, and a municipal plant. Since 1913 the company has gradually extended its operations; constructed a large hydro-electric development at Drummondville; acquired a power on the Magog River at Sherbrooke, with a street railway system; carried out a large amount of construction work in the way of sub-stations and transmission lines; and opened some sixteen stores for the selling of household electric appliances.

Properties Controlled

Today the company owns or controls the following properties:— South Shore Power and Paper Company, Limited; La Cie de Gaz, Electricite et Pouvoir; the St. Johns Electric Light Power Company; Brome Lake Electric Power Company; Richmond County Electric Company; Sherbrooke Railway and Power Company; Lennoxville Light & Power Company Limited; Eastern Townships Electric Company; Stanstead Electric Light Company; Burroughs Falls Power

Company; and the International Electric Company of Vermont. There are more than 50 cities and towns served by the company with light and power, including Sherbrooke, St. Hyacinthe, St. Johns, Iberville, Lennoxville, Drummondville, Granby, Waterloo, Richmond, Beloeil, Rock Island, St. Cesaire, and Rougement, a combination of industrial and agricultural districts. The extension of the operations of the company has involved the building of a transmission system of over 250 miles and of several sub-stations.

The powers on the St. Francis and Magog rivers are capable of furnishing 150,000 h.p., this being made possible by the construction of the Allard dam by the Quebec Streams Commission, which conserves the waters of the St. Francis river. Lord's Falls at Drummondville have been developed to give 7,000 h.p., but this plant has an ultimate development capacity of 18,000 h.p. The power on the Magog at Sherbrooke is utilized to the extent of 4,000 h.p., but this can be increased considerably, while similar developments on the Yamaska and Salmon rivers will also increase the power available. The present supply is supplemented by a small steam plant, and by power purchased from the Shawinigan Water and Power Company and the Montreal Light, Heat and Power, Consolidated. The company has a programme of further extensions as the demand for power increases.

The policy has been, and is, to build lines wherever there is a reasonable promise of business—and in order to promote the use of power in particular, the company's rates

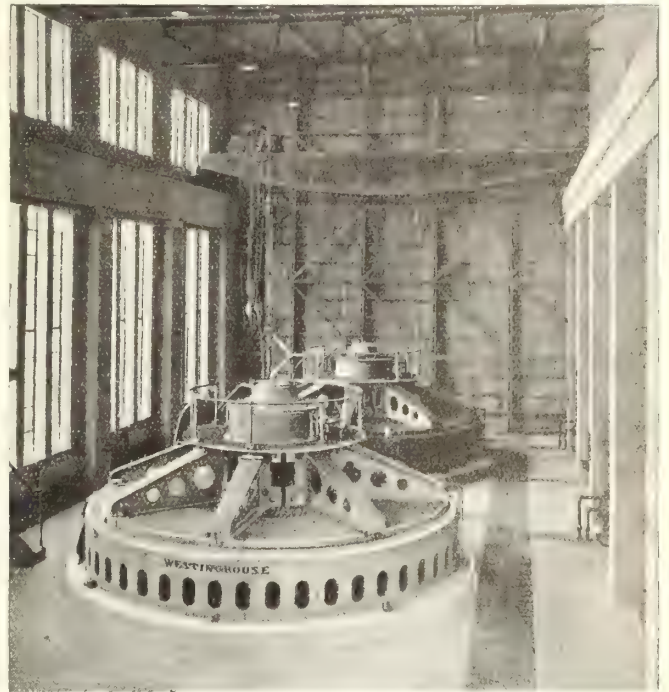
are on a basis which is fair to the consumer and profitable to the company.

Securing Industries

It was early recognized that if a large volume of business was to be built up, and maintained for power, an aggressive policy in securing additional industries must be adopted. Accordingly an industrial department was inaugurated. The results have more than justified the institution of the department. Successful efforts have been made to locate many additional industries, British and American, in the territory of the company. The companies so located are of great importance from a national as well as from a provincial standpoint. They represent, in some instances, the establishment of new industries, thus developing our natural resources, making Canada less dependent upon our neighbors across the line. The Southern Canada Power Company, while promoting its own interests, is in a very direct way furthering national prosperity. The fact that United States manufacturers can secure dependable power has been a very strong factor in inducing them to build branch factories here. Besides the power situation, such manufacturers obtain other advantages by locating in Canada, not the least being immunity from the tariff charges which would be leviable if the goods were manufactured over the border, and the ability to serve in a more efficient way the Canadian market.

The company has been able to secure industries by showing that the Eastern Townships are admirably suited for manufacturing purposes—power service at a fair rate; excellent railway facilities; a good supply of labor; and cities and towns where living conditions are desirable. The districts which the company serve are diversified in character in that they include both industrial and agricultural

while there are certain advantages, such as labor, which are common to all cities and towns in the Eastern Townships, there are some districts which will better serve the requirements of a given industry than others. The industrial department, therefore, pays great attention to suitable locations, recognizing that the proper development of the in-



A View of the Drummondville Generators.

dustries is the measure of the prosperity of the company.

The company believes in the policy of educating the public to a more liberal use of electrical appliances. Hence, the establishment of stores at the principal centres and the opening of large store rooms where appliances of every description are on sale. By such means the public are forcibly reminded of the advantages of purchasing time and labor saving electrical devices.

Drummondville Development

The development of Drummondville is the most important on the company's system. In order to utilize the fall of 32 feet in the St. Francis river, a large dam was constructed to divert the flow of the river. The dam is of concrete, 1890 feet long, running diagonally across the river, diverting the flow to one side of the river and to the forebay. A stop-log section, 260 feet long, consists of 9 piers. The apron of the spillway section is at the same elevation as the bed of the river. The remaining 1630 feet of the dam is an overflow section with a maximum height of 16 feet. The portion from the forebay wall to the sluice section is built with a tunnel 4 feet wide and 7 feet high, giving access to the deck of the sluice section. The forebay is enclosed with concrete walls. The Canadian National Railway crosses the forebay entrance by a two-span steel plate girder bridge. A two-span reinforced concrete road bridge also crosses the canal north of the railway.

The power house and transformer house are under one roof. The former is 71x66 and the transformer house 37x101. The building is of reinforced concrete. The intake of the power house provides for four units, only two of which are now installed. The equipment consists of two 3,500 h.p. vertical shaft water wheels, manufactured by the Boving Hydraulic & Engineering Company, direct coupled to vertical shaft Westinghouse generators, three phase, 3125 kv.a.



Outdoor Substation, Southern Canada Power Company's System

operations, and in this way the company is not entirely dependent upon any one class of customers for its revenue.

It is the policy of the industrial department to recommend suitable sites to those concerns which have under consideration locating in the company's territory. This is a very important element in the success of any industry, and

2300 volt, 60 cycle, 100 r.p.m. The wheels are governed by the latest pattern of Woodward oil pressure governor, 30,000 ft. lbs. capacity, and the plant operates in parallel with the other power stations of the company. The generators are fitted with an air brake, the pressure for which is maintained in a container by a motor-driven air pump, operated by an automatic air pressure switch. There are two exciter sets of 100 kw. capacity, either of which is capable of providing excitation for the entire plant at present installed, together with contemplated extensions. Both exciters are arranged for use with voltage regulators. One of these sets is driven by a water wheel manufactured by the Boving Hydraulic & Engineering Company, and governed by a Woodward governor. The other exciter is driven by a 2,300 volt, 3 phase induction motor. These exciters

the transformer disconnecting switch arrangement, any of these four transformers may be included in the bank with the minimum of delay. The oil pumps and water circulating pumps are electrically driven, and are all in duplicate. All of this auxiliary machinery is located in the basement. Above the transformers, on a gallery, are placed the electrolytic lightning arresters, and the 48,000 volt oil and disconnecting switches and choke coils, the high tension connections passing thence to the out-going line.

The gate-room is separated from the main operating room by a longitudinal wall, and forms a mezzanine floor. The main gates are electrically operated, by means of a motor with clutch and counter shafting. The racks are also located in this room, and between the racks and forebay there is a curtain wall. At one side of the forebay



Southern Canada Power
Company's Power House
and Forebay, Drummond-
ville.

are both fitted with equalizing switches and feed to exciter buses, from which the station emergency lighting and relay system are also operated. The switchboard is on a gallery overlooking the entire operating floor. It consists of eleven panels. The first panel is fitted with meters and switches for the control of the d.c. side of the two exciters. The second panel provides for the control of the a.c. side of the motor-driven exciter set. The third panel provides for voltage regulators. The fourth and fifth panels control the two vertical shaft generators. The governors for each of the main units are also electrically controlled from the panels. The sixth and seventh panels provide for future generators. The eighth panel contains the totalizing instruments. The ninth panel controls the transformer tank, which feeds on the outgoing 48,000 v. line. This panel contains a switch for the electrical operation of the high tension oil circuit breaker. The tenth panel is for the control of a one to one transformer insulating the buses from the local feeders. The eleventh panel controls the station service and local feeder circuits.

The oil switches are, with the exception of the station and local service circuits, all mounted below the gallery. Double bus operation is provided throughout.

The transformer bank consists of three 1,000 kv.a units oil-filled, water-cooled, 2,200 to 48,000 v., with taps. There is a spare transformer of the same size, and by means of

there is a trash gate. The sluice way is provided with 10 sections and the stop logs are operated by a lifter, which is electrically driven.

The spillway section is provided with receptacles for the installation of flush boards when required.

For administrative purposes, the territory of the company is divided into divisions, each with a superintendent, and for the purpose of co-ordinating the work, periodical conferences of the superintendents and the head office staff are held in Montreal. In this way a co-operative spirit is cultivated, making for efficiency and harmony.

The president of the company is Mr. W. C. Hawkins, who is also managing director of the Dominion Power and Transmission Company, Hamilton, Ont.; the vice-president and general manager is Mr. J. B. Woodyatt; with Mr. L. C. Haskell, secretary-treasurer and purchasing agent; Mr. C. Johnston, assistant secretary-treasurer and comptroller; Mr. P. T. Davies, commercial manager; Mr. J. S. H. Wurtele, plant manager; Mr. G. R. Atchison, merchandise manager; Mr. J. H. Trimmingham, chief engineer; Mr. J. W. Dunfield, operating superintendent.

The Toronto Transportation Commission will give the motor bus a tryout in West Toronto. Street car tickets will be accepted as fare and a transfer system adopted.

The Laurentian Power Company

*A Plant of Twenty Thousand horse power, ultimate capacity, that typifies
Some of the Best Practices in Engineering Design and Construction*

By JAMES RUDDICK, Manager and Engineer

The Laurentian Power Company, which was originally the Stadacona Hydraulic Company, commenced delivering power in the early part of 1916 to the Quebec Railway, Light, Heat and Power Company, at their Montmorency power house, with whom it has a contract for 10,000 h.p. The plant is situated at Seven Falls, on the Ste. Anne river, in the county of Montmorency. This river discharges into the north side of the St. Lawrence, about 25 miles below the city of Quebec. The plant is, roughly, five miles from the river St. Lawrence in a straight line, and about ten miles by road. Seven Falls, as its name implies, consists of seven falls, close together, the total head available being 420 feet. The dam, which is of the Ambursen type, of reinforced concrete, is 75 feet high at the highest point, and about 450 feet long. This dam was originally built to give a maximum head of 412 feet at the spillway, but it was later decided to raise this spillway eight feet. This was done by a system of piers with stop-logs. These stop-logs are removed in the early spring, so that the spring floods can be dealt with, and replaced soon after the floods, so that the maximum head is available practically the year round. Fall floods up to 4,000 feet per second are handled by means of a 20 foot, "Stony" type gate operated electrically. The dam makes a lake behind it of about a mile and a half long and stores sufficient water to carry the maximum anticipated load (20,000 h.p.) for 24 hours. The minimum flow of the river is sufficient to give 7,500 h.p., but a system of storage dams is being built by which the plant will be able to deliver 20,000 h.p. Some of these dams are already built and others are in course of construction.

The Storage Dams

The storage dams are being built by the Quebec Streams Commission, a department organized by the Provincial Government to undertake the regulation of the flow of rivers in the province of Quebec. Owing to the onerous conditions attached to the building of these dams, outside contractors asked such large figures that the Laurentian

Power Company undertook to build them themselves, acting as contractors for the Quebec Streams Commission. The regulation of the flow of the river by means of these dams so far has been very satisfactory. The reservoir created by raising the main dam at Seven Falls has proved to be invaluable, inasmuch as it allows the flow to be regulated without any wastage. No difficulties were experienced in getting water to the plant in the winter from the Lac Brule dam, which is, approximately, 15 miles from the plant. The two head-gates which are placed in the main dam are hand-operated and so arranged that they can be electrically operated in the future should it become desirable. Long distance electrically controlled stage water recorders are installed, so that the switch-board operator can see at all times the height of water at head-gates.

Steel Penstock

The steel penstock is eight feet in diameter and, approximately, 3,000 feet long. It is built on concrete piers, some of these piers being fitted with iron saddles with special arrangements to allow for any movement which may take place. A surge tank, 75 feet high and 16 feet in diameter, is placed at about the centre of the penstock. Both the penstock and the surge tank are housed in with rough boards covered with galvanized iron. At intervals of about 400 feet, fire walls are placed to prevent destruction in the event of fire. The covering on the surge tank is kept about 12 inches from it to allow an air space. At the bottom, four electric heaters are installed to prevent freezing in winter. These electric heaters are made of galvanized iron and carry each 10 amperes, two being placed in series on a 550 volt circuit. No trouble has been experienced with freezing in the surge tank or penstock, even when temperatures as low as 38° below zero have been registered.

The Turbines

The turbines, which were built by the Allis-Chalmers Company, are rated at 6,000 h.p. each, four being installed.



Dam of Laurentian Power Co. on St. Anne River.



Plant of Laurentian Power Co. on St. Anne River, Quebec.

They are of the Francis type and have cast steel cases 2 inches thick, the speed being 640 revolutions per minute. I may say that, under test, these machines gave as high as 8,000 h.p. for a few moments, and were able to give continuously 7,500 h.p. The maximum efficiency which is at about 8/10 gate opening being about 90%. Automatic relief valves are fitted to each turbine, also one in the centre of the distributor.

The Generators

The generators, which were built by the Canadian General Electric Company, have a rating of 4,680 kv.a. and are of exceptionally heavy construction throughout.

The exciters, which were also built by the Canadian General Electric Company, are driven by Pelton wheels, the wheels being built by the Allis-Chalmers Company.

The generators deliver power at 6,600 volts to Westinghouse o.i.w.c. transformers, where it is stepped up to 50,000 volts for transmission. Each generator supplies one bank of three single phase transformers, each having a rating of 1566 kv.a. Both the low tension and the high tension bus-bars are divided in two by tie-switches, so that either half of the station can be operated independently.

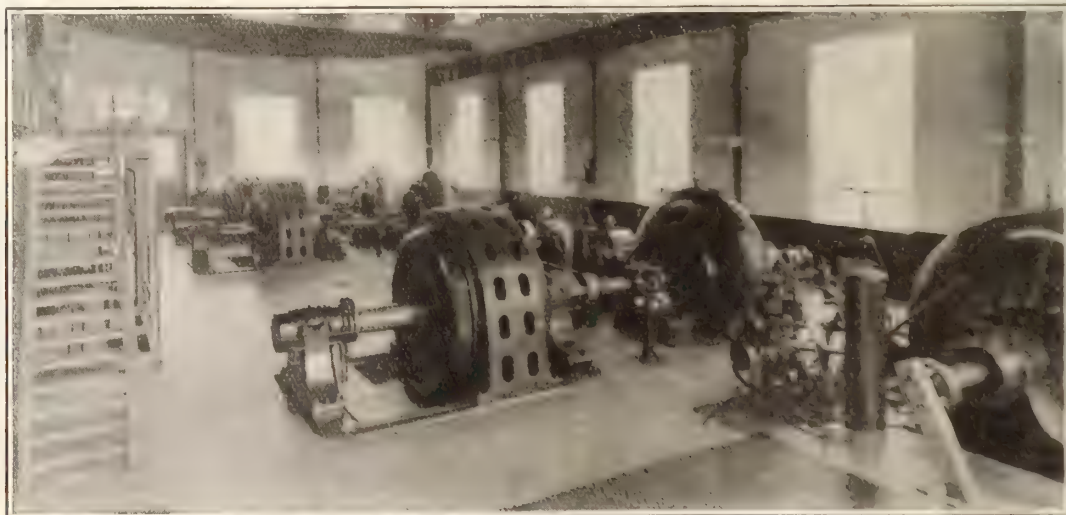
The switch gear is operated from a bench board and was supplied by the Canadian General Electric Company. It is of ample proportions to take care of any conditions which may arise. C.G.E. electrolytic lightning arresters are installed.

The station has been in continuous operation since the early part of 1916, without any serious defects being apparent. No shut-downs of any kind have been experienced due to faulty operation or defects in equipment, although several momentary interruptions have been caused by persons throwing wire on the main transmission line, and, on one occasion, by hay being blown on to the insulators of the towers, which was the cause of short circuits.

Double Transmission Line

The double transmission line, which is 24 miles long, is built on galvanized steel towers set in concrete foundations, the standard tower being forty feet high. At the St. Anne river, Beaupre, and the Montmorency river, Montmorency Falls, special strain towers are used to take care of 550 and 850 feet spans. No. 1/0 seven-strand copper wire was used for this transmission line, owing to the impossibility of getting aluminum at the time the line was built. On the long spans, No. 4/0 copper-clad steel cable is used. Two guard wires of 3/8 stranded steel cables are placed above the lines; every third tower being grounded with paragon cones.

66,000 volt Locke pin type insulators are used, excepting on the strain towers, where Locke four-section strain type insulators are used. Strain towers are placed at every two miles on the line. A telephone line of No. 8 galvanized steel wire is strung on 11,000 volt pin type insulators, mounted on the steel towers. The induction is drained off



Interior of Power House, Laurentian Power Co., Quebec.

with three 550 to 110 volt transformers placed one at each end and one in centre of line. The telephone stations are protected with the usual telephone transformers and cut-outs. Power is delivered at 64 cycle, 50,000 volts, to the Quebec Railway, Light & Power Company's station at Montmorency Falls, where it is stepped down to 25,000 volts parallel with the out-going lines of the Quebec Railway, Light, Heat & Power Company's station at which voltage it is transmitted to Quebec. The receiving station is equipped with the usual lightning arresters and o.i.w.c. transformers. Recording volt meter and watt meters, as well as

indicating instruments, are installed at the receiving station.

The plant was designed by Mr. A. R. Henry, M.E., consulting engineer, Coristine Building, Montreal, and the transmission line by Mr. James Ruddick, the Laurentian Power Company's engineer. The Board of Directors of the Laurentian Power Company consists of:— Hon. Adelard Turgeon, president; Mr. Neuville Belleau, vice-president; Mr. A. J. Nesbitt; Mr. F. J. Bell; Mr. H. Horsfall. Manager, engineer and secretary, Mr. J. Ruddick, with headquarters at Beupre. Superintendent, Mr. H. Taylor, with headquarters at Seven Falls.

The Ottawa and Hull Power and Manufacturing Company, Limited

Supplies Power to Many Industries in the Two Cities. Operating two Power Houses. Initial Installation of newest Plant just Completed

By L. A. HERDT, D. SC.

The Ottawa and Hull Power and Manufacturing Company operates two power houses about 500 yards apart at the Chaudiere Falls at Hull, Province of Quebec, on the Ottawa River, supplying power to various industrial establishments in the Province of Quebec, namely: The British American Nickel Corporation at Aylmer, the Canada Cement Company at Hull, the Hull Iron and Steel, the Hull Electric Railway, Hydro-electric Commission of Ottawa, and others.

The first power house has been in service about fifteen years. The distributing voltage is 11,000 volts, three phase, and all power is controlled and distributed from the new power house on "Table Rock". This power house has just been completed with the initial installation of two 10,000 horsepower units.

The output of the old power house is carried into the new power house switchboard over two underground tie lines capable of transmitting the whole output of the old plant, namely, 12,000 horsepower.

The switching layout is divided into feeder groups of two feeders for each generator, and each tie line and each group may be isolated from the main bus bars.

The new generators are wound for 2,300 volts, three phase, each directly connected to a three-phase water-cooled

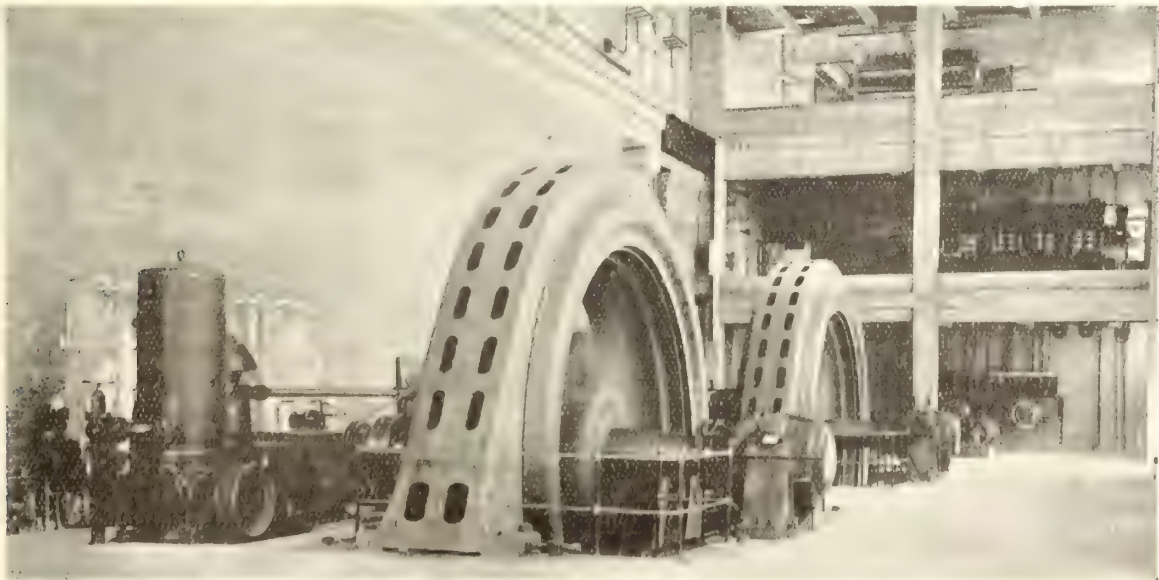
transformer, raising the voltage to the bus bar voltage of 11,000 volts.

These transformers are located in pockets below hatches in the generator floor between generator foundations, and no switching of any sort is used on the low voltage side, so that the generator with its transformer is used and controlled as an 11,000 volt generator unit. In this way, a higher factor of safety of insulation is obtained at a lower first cost than would have resulted from the use of generators wound for 11,000 volts.

Pilot wire balance relays have been used to protect the transformer windings and cables to the oil switch on the 11,000 volt bus structure. These relays operate to open the generator switch in the switch house, and the generator field switch in case of fault in this equipment.

As all distribution is carried out from the new power house and the old power house sends all its power over the tie lines, the operation of this latter plant is very simple, and at the present time it is mainly used as a reserve plant, operators being sent over from the new plant when required.

The consulting engineers of the plant were Mr. Wm. Kennedy, Jr., hydraulic engineer, and L. A. Herdt, D.Sc. and E. Godfrey Burr, B.Sc., consulting electrical engineers.



Ottawa and Hull Power & Mfg. Co.'s Power House No. 2.



Weedon Power Plant, Sherbrooke Municipal System.

Hydro Development by Sherbrooke City

One of the few Municipal Ventures in the Province of Quebec. Operating three Generating Stations. City growing very rapidly

By G. J. DESBAILLETS

The City of Sherbrooke is an illustration of the results obtained by a corporation which gave careful attention to the matter of power development and by concentrating its energies on the financial support and moral encouragement of such an enterprise carried it successfully through political disturbances and changes of civic administration.

The corporation of Sherbrooke owns three hydro-electric plants, one gas plant, one water-driven pumping station and a complete distribution system; in addition it controls two undeveloped water powers on the St. Francis River.

Rock Forest

One hydro-electric development, known as the Rock Forest plant, is located on the Magog River, six miles from Sherbrooke, and benefits from the storage of Lake Mamphremagog and little Lake Magog. The plant operates under a 36-foot head and consists of a reinforced concrete stop-log dam and a concrete and brick power house containing two 930 kw. 3-phase generators delivering 60-cycle current at 6,000 volts. The exciters are water-wheel driven. A two-circuit transmission line, six miles long, delivers the generated power to the Sherbrooke sub-station.

Magog River

Another plant which also benefits from the same storage as the Rock Forest plant is located on the Magog River in the city. Two 1000 kv.a. water-wheel driven 3-phase generators, delivering current at 2300 volts, are installed. A 34-foot head is available and is maintained by a reinforced concrete stop-log dam. The developed energy is transmitted to the sub-station at 2300 volts, by a double transmission line, 3000 feet long.

The Weedon Plant

The third plant owned by the corporation is located on the St. Francis River at Weedon. Operating conditions have been greatly improved by the erection of the Quebec Government dam in Lake St. Francis. A reconstruction of the Weedon plant is taking place and a new reinforced concrete dam is practically complete. The new plant will operate under a 34-foot head. Two 1300 kw. 3-phase generators delivering 60-cycle current at 2300 volts will be operated.

A motor-generator exciter set is used, the driving power being taken from the system, to which three plants are tied at the Sherbrooke sub-station. The generator voltage is stepped up to 55,000 volts and the energy is transmitted to the Sherbrooke sub-station, 30 miles away, on a single circuit, 3-phase transmission line.

The power at Two Miles Fall is as yet undeveloped. This potential site is located one mile below the Weedon plant and if developed would transmit power to Sherbrooke on the Weedon line; a capacity of 8000 h.p. is available. Another undeveloped power is available at Westbury, about 18 miles from Sherbrooke on the St. Francis River. About 3000 h.p. is available here.

Sub-Station at Sherbrooke

The sub-station at Sherbrooke is designed to take care of a total output of approximately 20,000 h.p. A ring type double set secondary busbar is installed; each section of the bus takes care of one of the five plants (three in operation at present). Up to date the three power houses have been operated in parallel on this busbar with satisfactory results. Space is provided for the installation of limiting reactances should the operation of the five plants later prove to require such a precaution. Two synchronous condensers are installed in the sub-station and are automatically regulated by a motor generator exciter which has the field of the d.c. generator controlled by a Tirrill regulator.

A close check of the operations of various customers is kept by means of graphic instruments located in the office of the superintendent. This set can be inserted in any one of the 32 outgoing feeders in a fraction of a minute and enables the corporation to obtain due compensations for power factor and other penalized items of various contracts.

Owned by City

It was in 1909 that the corporation of Sherbrooke purchased from the Sherbrooke Light and Power Co. the two power plants, one within the city limits and the other the Rock Forest plant. At that time the corporation reported that the assets of the gas and electricity department were \$351,365 and the liabilities \$252,175, the profit and loss account being credited with a surplus of \$99,190. It was resolved that all profits made by the gas and electric de-

partment would be deposited in the city's treasury to pay for additions to plant equipment and improvements. The result of this policy is shown by the 1920 statement, which shows assets of \$2,371,394, liabilities of \$1,749,350 and a net accumulated profit of \$854,603. In 1909 the gross earnings were \$82,376 with a net profit of \$16,672, whereas in 1920 the gross earnings were \$328,688 with a net profit of \$100,213.

The population of Sherbrooke in 1910 was 15,171 and the factories numbered 10, employing 450 people. Today there is a population of 25,000 with 44 factories employing 6169 people.

Hence it is seen that in this march toward progress the available electric power has been a main factor; its reasonable cost has induced customers to locate in Sherbrooke. This example should strengthen the opinion of those who see that the economic conditions of this country may be improved largely by the co-operation of owners of water powers.

The amount of developed water power in the province of Quebec is 1,042,000 h.p.; if sold at an average yearly price of \$25 per horse power this represents an income of \$26,000,000.

Our province imported from the U.S.A. in 1919 2,475,800 tons of steam coal for power purposes, representing \$25,000,000 of Canadian money spent in a foreign country, and we have used 50,000 tons of Canadian steam coal for power purposes, representing \$400,000 only of Canadian money spent in Canada.

Poor Business Methods

We buy practically as much steam power outside as we buy electric power from ourselves and yet we have 6,000,000 h.p. of undeveloped water power at our disposal.

Knowing that we have such vast resources at our disposal, we should not place ourselves in the position of a man who owns a garden and buys his vegetables outside; we can develop our own water power and produce energy at one-third the cost of that developed with imported coal. Water powers even as small as 50 h.p. should be developed and disposed of locally; this would relieve the larger companies of the political obligation of retailing power along their large transmission lines and of the smaller stations and switching equipment which often entail the interruption of large amounts of power.

A Good Investment

This problem must be solved by the engineer. His disinterested and sound advice is the only thing that can

convince the capitalist that money invested in power development is well invested.

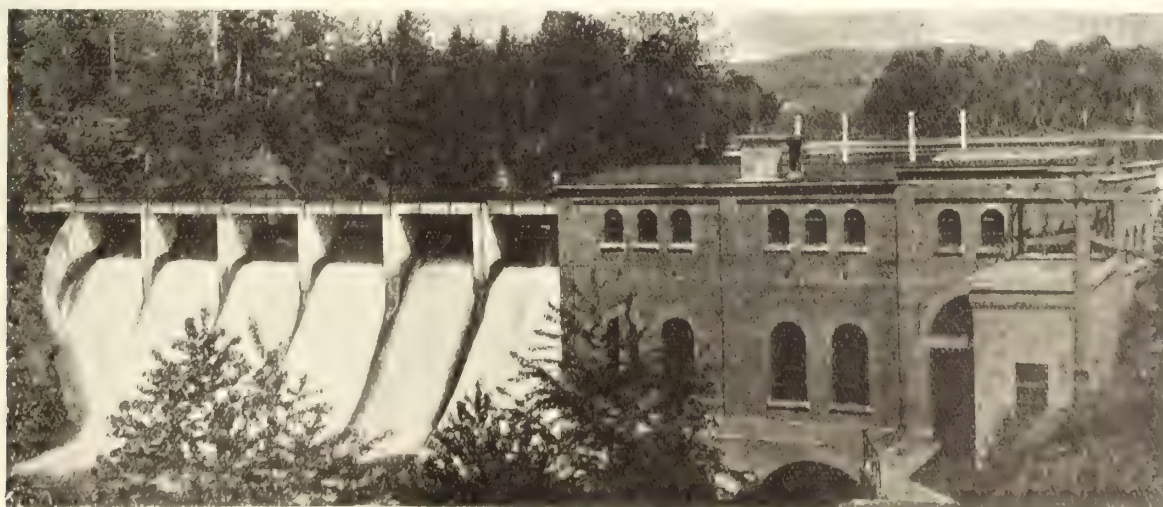
That 6,000,000 of undeveloped horse power means 150 millions of dollars passing before us every year, but beyond our reach. A number of engineers have understood the imperative necessity of preserving the resources of our province and the result of their efforts may be seen in many storage dams scattered over vast territory.

We must be strong materially and morally to go through the present period of unrest; the future of this country must be established on a basis that can not be disturbed by foreign politics nor undermined by foreign capital. We must depend solely upon ourselves, upon what we have made and what belongs to us. The countless water powers of our province offer one of the best means of development; it is our duty to harness every one of them and to establish them permanently as the basis of our prosperity and strength.

The La Chute Shuttle Company

The La Chute Shuttle Company, Ltd., La Chute Mills, is an old established Quebec firm that is known from coast to coast. This company has been engaged in the manufacture of wooden articles for the last 25 years, pole line materials being one of their principal specialties. In view of their experience with large business entrusted to their care over a long term of years by telephone, telegraph and electric light and central station systems all over Canada, they have a thorough knowledge of the varied requirements of the industry and splendid facilities for supplying goods which are in every way suitable for the purpose for which they are intended. They specialize in materials of the highest grade, and which will meet the most rigid specifications of the largest consumers of cross arms, top pins, side blocks and pole steps. Their products are free from defects, are well machined and, we believe, are rightly claimed to be superior to much of the foreign material of similar products to be found on the market. The company has a most modern plant and can take care of the largest requirements.

W. H. Reynolds, western manager of the Eugene F. Phillips Electrical Works, Ltd., left Winnipeg on the 21st of August on a business trip to Vancouver. It is his intention to spend a few days in Calgary and Edmonton on the return journey. Mr. Reynolds expects to return to Winnipeg in the early part of September.



Rock Forest Plant, Sherbrooke Municipal System.

Historic Quebec an Electrical Centre

The Activities of the Quebec Railway, Light, Heat and Power Company date back Nearly Forty Years—Now Distributing Power Supplied from four Sources

By LOUIS BURRAN, Electrical Engineer Q. R. L. H. & P. Co.

Pivotal point in the great duel fought in the Seventeenth Century by England and France for mastery of the New World, Quebec has not only all the glory and glamor of splendid historical tradition around it, but has also the irresistible charm of noble scenery and the tremendous commercial attraction of a strategic point dominating the water-borne traffic between the Atlantic and Pacific oceans. It may be compared with many other notable cities of beautiful site, but will always remain unique and distinguished as the ages add other memories to those of Cartier, Champlain, Frontenac, Wolfe and Montcalm, or witness the steady and stately development of its superbly rich natural resources, even today almost virgin after three hundred years' occupancy by the two most vigorous colonizing races of Western Europe.

With all its subtle old-world atmosphere and curious aloofness from some of the things on which modern civilization looks with pride, Quebec has in its recognition and adoption of electricity kept fully abreast of the times. As early as 1884, the city was supplied with electric light by the old Quebec and Levis Light Company. Two Thomson-Houston dynamos were operated by steam power in an old military barracks beneath the fortification walls adjacent to St. John's Gate. These were used to furnish current

for series arc lamps, 9.6 amperes, placed in the stores, rinks, and other establishments.

The possibilities of hydro-electric generation and transmission were early taken cognizance of in Quebec, and one of the earliest of such plants was installed at the famous Montmorency Falls. This was followed by the construction of the first long distance transmission line in Canada, to Quebec City.

In 1887 the city streets of Quebec were lighted with double-carbon series open arcs, current to which was supplied from 18 Thomson-Houston dynamos. In 1888 an attempt was made to operate incandescent lamps in multiple from the series circuits; but this interim method soon gave way to the alternating current system and apparatus. Two 100 kw., 1000 volt, single phase, 130 cycle generators were then installed, followed quickly by two others, and the electrical energy thus generated was transmitted to Quebec, the 1000 volts being there transformed, and the current was distributed at 52 volts, that low pressure being adopted on account of the prejudice then prevailing as to the dangerous nature of alternating current even at so low a voltage.

In 1893, the utility interests owning the property changed its name to the Montmorency Electric Power Com-



Upper Dam, Montmorency River.



The Quebec Railway Building, corner of St. Joseph and Crown Streets, Quebec.

pany, and in the following year a new power house was built with a steel flume 6 feet in diameter, and with a head of 170 feet. To this plant most of the Thomson-Houston dynamos were transferred. Three belted 600 kw., two phase, 6,000 volt, 66 cycle generators were also installed. These were the first machines of this type and voltage installed on the American continent. The current was transmitted at this pressure to the sub-station in Quebec, transformed to 2200 volts, and distributed on single phase lines for lighting. This pressure was again lowered to 110 volts for service connections and a 24-hour service was at once inaugurated. Circuits of two phase were run, and electrical energy was supplied to a large number of motors for commercial purposes.

Railway Electrified

About 25 years ago, in July, 1897, current was first supplied to the Quebec District Railway to operate its street railway system, by means of motor generators placed in the sub-station, in the city. In the same year, the three alternators were direct-connected to water-wheels of modern type; an additional 600 kw. alternator was installed in the Montmorency power house and the hydro-power flume was carried as far back as the head of the Falls, furnishing a total hydraulic head of 190 feet; and a concrete dam 300 feet long was built, displacing the old wooden dam. As the two public utilities thus grew closer together and now depended upon a common source of power supply, a financial consolidation followed naturally upon the physical, and in 1898 the Montmorency Electric Power Company, the Quebec District Railway Co. and the Quebec, Montmorency and Charlevoix Railway were all amalgamated under the name of the Quebec Railway, Light & Power Company. The system of the company was shortly afterward extended by the electrification of the steam railway which had formerly run to St. Anne de Beaupre. A 600 kw. direct current generator was installed at the Montmorency power house, and a 200 kw. motor generator at

St. Anne de Beaupre, 14 miles away, to operate this division of the system.

Still another development came in 1907 when a further utilization of the abundant and splendid water power was made at the "Natural Steps" on the Montmorency River, about a half mile above the Montmorency Falls, with an initial capacity of 1500 kw. Moreover, in 1909 an important improvement of a technical nature was made when the transformation system was changed from 2-phase to 3-phase, 23,000 volts, and "Scott connected" transformers were installed at Montmorency and Quebec.

A further step in the physical and financial relations of the local properties was taken in 1909 when a merger was carried out, comprising the Quebec, Jacques Cartier Water Power Company, the Frontenac Gas Company, the Canadian Electric Light Company of Levis, P.Q., the Quebec Gas Company, the Quebec Railway, Light & Power Company, and the parent company became known as the Quebec Railway, Light, Heat and Power Company, Limited.

Four Sources of Power

At the present time the company is producing power from four waterfalls; these include two on the Montmorency River, one on the Jacques Cartier River and one on the Chaudiere River. Of these, perhaps, the most important development is that at Montmorency Falls, where a head of 208 feet is used. The dam is of concrete, 265 feet long by 22 feet high. A steel conduit, 8 feet in diameter, tapering to 6 feet, and 2,600 feet long leads to the power house. Five 1,000 h.p. turbines are installed in the power house and each is direct connected to a 600 kw. generator. One of these generators is used for electric railway purposes and is rated at 600 kw., 550 volt d.c.; the remainder are 2-phase, 63 cycle, 5,500 volt. The energy is stepped up to 24,000 volt, 3-phase by four 1,000 kw. station transformers; these also take care of the energy from the Natural Steps plant. The energy which



Interior of Power House, Montmorency Falls.

is received from the Laurentian Power Company is stepped down from 44,000 volts to 24,000 volts by three station transformers of 1500 kw. capacity.

The Natural Steps plant is situated one mile above the Montmorency plant on the same river. A concrete dam 240 feet long by 80 feet high forms a reservoir affording pondage for both power houses. Water is carried to the power house through a 10-foot penstock, 80 feet long. The installation consists of one 2,000 h.p. turbine, direct connected to a 1500 kw., 2-phase, 63 cycle, 5500 volt generator. The energy from this plant is transmitted to the Montmorency plant for transformation and further transmission to Quebec.

The Valcartier plant, formerly owned by the Jacques Cartier Power Company, is located 18 miles from Quebec City on the Jacques Cartier River. The dam is somewhat unusual, being divided into two portions by an island; it is rock filled, 20 feet high by 400 feet long. One end terminates in a masonry bulkhead whence two 14-foot conduits lead to the power house. There are two 1500 h.p. turbines, each direct connected to a 750 kw., 3-phase, 60 cycle, 2000 volt generator. The voltage is stepped up to 24,000 volts, 3-phase, by six station transformers of 330 kv.a.

The development on the Chaudiere River, which was formerly operated by the Canadian Electric Light Company, is located at Chaudiere Falls, about nine miles from Levis. A concrete dam has been constructed, consisting of two portions, a cross dam and a longitudinal dam, having a total length of 1,082 feet. The available head of water is 114 feet. The power house equipment comprises one 2000 h.p. turbine, direct connected to a 1000 kw. generator and two 1400 h.p. turbines, each direct connected to a

750 kw. generator. Energy is generated at 3-phase, 63 cycle, 10,000 volts.

The transmission from the Montmorency plant, and from the Valcartier plant to Quebec is carried out at 24,000 volts, 3-phase, 63 cycle. In both cases the conductors are supported by pin-type insulators on wooden poles. A connection between the north and south shore systems is accomplished by two submarine cables which transmit energy at 10,000 volts, 3-phase, from Levis to Quebec or vice versa.

Some idea of the magnitude of the enterprise thus built up since 1884 around old Quebec—"cradle of New France," and today a key and gateway of Canadian development—may be formed from the fact that the gross earnings of the Quebec Railway, Light, Heat & Power Company in 1919-20 reached a total not far short of \$2,500,000. The officers of the company are Hon. Lorne C. Webster, president; Hon. D. O. L'Esperance, vice-president; Mr. W. J. Lynch, general manager, and Mr. Arthur LeMoine, secretary. Mr. A. P. Doddridge is superintendent of the Power Division and Mr. J. B. Dorais of the Levis Division; Mr. L. Burran is electrical engineer, and Messrs. W. Langford and T. Atkinson are superintendents of the Montmorency power house and the Quebec sub-station, respectively.

The development of cheap electric power in the vicinity has accentuated to a degree the natural advantages of Quebec City. The visitor to the city discovers that it is not only attractive to the tourist but is fast becoming one of the important business centres of the country. A great activity in various progressive movements has been inaugurated and, indeed, a "New Quebec" may be said to have developed within the last few years; the future of the old city promises much.

The Power Situation in the Province

General Review of the History of Development—Incredible Increase in Demand for Power, by Industries—Labor Troubles Almost Unknown

By R. J. BEAUMONT

In a brief survey of the electric power developments and possibilities of the Province of Quebec two outstanding features are to be observed, the most important of which is the amount of water-power that yet remains to be utilized for this purpose, and of secondary importance the rapid developments of water-power for electrical generating purposes during the last twenty years.

There are throughout the Province a number of small water-powers that have been used for supplying mechanical power for a great many years which were in use before electric light was commercialized, this latter form being the first practical use of electrical energy. These powers were and some are still used for operating pulp and paper mills, saw mills, grist mills and for such similar purposes.

One of the most important early examples of the application of water-power for electrical purposes in Canada was the development of the falls at St. Narcisse on the Batiscan River. A plant of a little more than 1,000 horsepower was built and the power conveyed to Three Rivers, a distance of about 16 miles. An interesting feature of this little plant is that it was the first used to generate power for high tension transmission in the British Empire, electric power being delivered over the transmission line at 11,000 volts in 1895. It is a very small undertaking when considering voltages, amounts of power and distances dealt with successfully to-day.

We will consider in a few words the growth of development around Montreal during the past twenty years. The first plant of importance may be said to be the Lachine plant. This plant has been in operation since 1898 and has a capacity of approximately 15,000 h.p.

Simultaneously with the construction of this plant there was put into operation the Chambly plant with a somewhat larger capacity. The Soulanges plant on the Soulanges Canal just below the Cedar Rapids plant was completed in 1908.

In addition to these plants which were constructed to supply the demand of the city of Montreal for power, the year 1903 saw the putting into operation of a generating plant at Shawinigan Falls and the transmission of power to Montreal. At that time the proposal to send power in from Shawinigan to Montreal, a distance of 100 miles, was considered a very speculative scheme by many people and the experiment was watched with great interest.

After the completion of the first wood pole line to Montreal another similar line was soon undertaken and owing to the continued demand in Montreal the year 1911 saw the completion of a double circuit steel tower line supplying power at 100,000 volts, making four lines in all between Shawinigan Falls and Montreal. There is in addition another double circuit steel line in course of construction.

In 1911 a plant at St. Timothee was put into operation, this plant taking power from the Beauharnois Canal with a transmission line to Montreal, the capacity of this plant being approximately 30,000 h.p.

The next large development after the development at Shawinigan Falls, and one which represented a definite progressive step in hydro-electric engineering development, in so

far as this country is concerned, was the construction of the Cedars Rapids plant. This plant was a large engineering undertaking. It is a low head plant with 12 vertical type units of approximately 11,000 h.p. each. The final development provides for 18 such units. This plant supplies power to Montreal and also power to Massena where it is used for industrial purposes.

The latest large plant to be put into operation for the purpose of providing power for Montreal and vicinity is the plant at Grand Mere. This plant has a capacity of about 120,000 h.p.

It will be seen from the foregoing that the development has been rapid. In the same manner to perhaps a lesser degree, a similar development has occurred in Quebec City but space is too limited to deal with the subject at length. During the same period throughout the Province of Quebec there has been constructed a large number of small plants for electric power purposes. We might instance St. Anne de Beaupre, Sherbrooke, Drummondville and many others.

Undoubtedly a practically inexhaustible source of electrical power has been of the greatest value in developing the Province in the past few years and will continue to do so for many years to come. Considering this effect in Montreal we see a city using a tremendous amount of electric power, each year seeing a rapid increase in demand over previous years, and we may instance as indicative of this growth the load on the plants at Shawinigan Falls.

In 1905 the load was 20,000 h.p.; in 1910—50,000 h.p. in 1920—220,000 h.p. The effect on certain industries is to be easily seen. For example, in the asbestos mining industry the presence of the asbestos and the availability of electric power has made Quebec the foremost producer in the world. Again, in the paper industry a tremendous amount of power is used and the last few years have seen an almost incredible increase in the production of paper and in the amount of power used for this purpose.

Parallel with the work of construction of systems to fill the needs of the larger cities there has proceeded the building of a network of transmission lines to serve the smaller towns and villages. This network extends on the north shore of the St. Lawrence River west from Quebec City to and beyond Montreal and in a somewhat similar way on the south shore. This work of connecting up the smaller communities is continually going forward, though the smallness of the communities and the distance of their location from the main transmission line often makes the matter of giving them service a difficult problem from the financial viewpoint, and the serving of some of the more distant scattered farming communities is a problem yet to be dealt with.

The undertakings have practically all been financed by private capital and the results obtained indicated by the vastness of the power development and the number of people served is an indication of the broad attitude of the Provincial Government and local authorities with reference to the problem of the distribution of electrical energy.

Another important factor with the recent industrial development of the Province in addition to the matter of the availability of electric power, and which has been to a great



Right:
Ouatichouan
Falls,
Lake
St. John,
Quebec.

Left:
Metis Falls,
Metis River,
Manitoba,
Quebec.



degree responsible for the location of a large number of industries of the Province, is the labor situation and its plentitude and its freedom from strikes and disturbances.

Comparing the advantages of the Province of Quebec as a location for new industries with the Province of Ontario it will be seen that the province of Quebec has solid claim for first consideration. The Province of Quebec contains by far the greater proportion of our population as compared with Ontario or other parts of Canada, the city of Montreal itself being the geographical center of about three-quarters of the total population of Canada. Naturally it follows that for manufacturers there is to be found the largest market for common skilled labor of all trades. Moreover, the labor, principally French-Canadian, is content and conservative with a resultant freedom from industrial disputes.

The labor costs are also considerably lower than any other section of the country due to living conditions being more favourable; also cost of food products and figures easily obtainable show that as an average the labor in Quebec receives 25 per cent less than similar labor in the Province of Ontario.

With regard to the question of transportation, there are many railroad connections with Ontario and western Canada and with the Maritime Provinces, and excellent communication with various adjacent points in the United States, this latter comparing very favourably with the railroad connections of Ontario at points of Niagara Falls and Detroit.

Very little need be said of the tidewater facilities at Montreal, Sorel, Three Rivers and Quebec City, Montreal being one of the most important and best equipped ports of the world, its volume of foreign trade is second only on this continent to New York. Steamship services are maintained for Montreal to practically all the important parts of the world; Three Rivers lying at deep water and being only twenty miles away from Shawinigan Falls; Quebec City having a well equipped harbor and ample power supply.

It will be seen that from the point of view of concentration of population, availability of desirable labor, water and rail facilities that the Province of Quebec is without equal.

An interesting figure in connection with the comparative taxation situation is the fact that in the Province on Ontario the total funded debt is \$140,000,000 of which \$70,000,000 covers the Hydro-electric Power and Central Ontario system. Or, expressed in other words, about half of the Provincial debt is accounted for by electrical undertakings. This, of course, does not include the Ontario Government guarantees of the bonds for suburban lines and for the Toronto Street Railway.

The cost of electric power compares to advantage with Ontario considering the expensive developments at Niagara Falls. Also, in Ontario compared with the Province of Quebec, where private undertakings are the rule, is the fact that the public ownership of the electrical properties takes away for taxation purposes a large source of revenue to the Province.

The Hydro-electric developments in the different parts of the Province have been exceedingly favored by nature with



A Big Ottawa Industry-E.B. Eddy's Plant

regard to the fact that they lend themselves to the easy utilization of the power at minimum cost, Shawinigan Falls itself perhaps being the best example of such a condition to be found anywhere in the world.

Another feature is the location of the powers developed with reference to the position of the larger cities and the industrial requirements of the Province.

It is "Up to the Contractor"

There is not a manufacturing plant or commercial establishment of any kind which will not be well repaid by an examination of its provisions for artificial illumination with a view to securing a suitable lighting system, and this would open a tremendous field of business for the contractor. It is the contractor's job, therefore, to see that he presents the facts to the right authorities.



View of the Kipawa Plant of the Riordan Pulp & Paper Company

The Montreal Tramways System and its Service-at-Cost Operation

An arrangement whereby the Company is Guaranteed a Fair Return on Capital Outlay and the Patrons are Guaranteed a Satisfactory Service—Fair to both sides—Administered by Capable and Impartial Commission—An Interesting Review of the Situation

By PAUL SEUROT, Chief Engineer Montreal Tramways Commission

On the 5th of April, 1921, Mr. J. F. Saint-Cyr, chairman of the Montreal Tramways Commission, delivered a lecture before the Alumni of L'Ecole Polytechnique at Montreal. Mr. Saint-Cyr chose, as his subject, the contract signed by the City of Montreal and the Montreal Tramways Company and explained the reasons which led to the adoption of this contract, its workings and the results obtained so far. The present article is, substantially, a resume of Mr. Saint-Cyr's lecture.

In 1911 Montreal and its suburbs were served by 3 tramways companies operating under 30 franchises, some of which were perpetual and some of which were to expire between 1921 and 1961. Of all these franchises, the most important was the franchise granted by the City of Montreal and which was to run until the 1st of August, 1922. By-law No. 210 (March 8, 1893) was binding upon the contracting parties. In it was embodied an expropriation clause whereby the City could acquire the property of the Company by the payment of a sum equivalent to the value of the assets of the Company, plus 10 per cent.

In 1911, the 3 street railway companies operating in Montreal were merged into the Montreal Tramways Company, which acquired the rights and privileges of its predecessors and assumed their obligations.

In 1917, it was decided to have a new contract between the City and the Montreal Tramways Company and a Commission was appointed to draft the articles of this new agreement. After a year's work, during which all interested parties were invited to give their views, experts were consulted and street car systems of large American cities were inspected and studied, this Commission drafted the present contract, which was, subsequently, ratified by the Quebec Legislature.

Service at Cost

The contract is based on the "Service at cost" principle. According to this principle, it is taken for granted that a tramway service is indispensable to the life of a large city; that it is not only a public utility, but a public necessity. This being granted, means must be found to ensure the existence of this service and to place it at the disposal of the public under the most advantageous conditions.

The cost of tramway operation is made up, substantially, of the following items: Firstly, salaries of employees and cost of materials, which, together, represent the operating expenses and the maintenance and renewal charges; secondly, the return upon the capital value, which is a just and equitable charge, because, as the company remains the owner of its physical assets placed at the disposal and for the service of the public, it is only fair that the Company should receive the interest upon the capital value so loaned to the public. To the above items must be added a contingent reserve fund for unforeseen circumstances.

The makers of the contract have gone one step further; they have made the city a partner of the tramways company, the city receiving from the company an annual revenue

of \$500,000, and furthermore having the right to share in any surplus of the operation. This is, to all intents and purposes, the municipalization devoid of its dangers and inconveniences.

The execution of the contract is entrusted to the Tramways Commission, whose duty is to determine the expenses for each year and to provide the necessary revenues therefor by fixing the fares. This Commission, appointed by the Legislature, is headed by Mr. J. F. Saint-Cyr, as chairman; Mr. L. A. Herdt, as vice-chairman, and Mr. J. S. Archibald.

The operating expenses proper, as well as the maintenance and renewal expenses vary according to the requirements of the system under consideration and to the fluctuations of the cost of labor and materials which, within the last few years has been steadily rising.

Wage Increase

For instance, the wages of platform employees, of whom there are about 2000 in Montreal, have increased from 80 per cent. to 111 per cent. as shown in the following table:

1st year in service— 1917, 25c per hour; 1918, 31c; 1919, 37c; 1920, 45c. 2nd year— 1917, 25c; 1918, 31c; 1919, 40c; 1920, 50c. 3rd year— 1917, 26c; 1918, 33c; 1919, 44c; 1920, 55c. 4th year— 1917, 26c; 1918, 33c; 1919, 48c; 1920, 55c. 5th year— 1917, 26c; 1918, 35c; 1919, 48c; 1920, 55c. More than five years— 1917, 29c; 1918, 37c; 1919, 48c; 1920, 55c. The same proportion applies to the increases given to other employees.

The rise in the cost of materials is just as important, as shown by the few following examples, taken among many:

Cross ties in place, cost 80 cents each in 1917 and \$1.20 in 1920.

115 lb. girder grooved rail with fastenings and joints, per 1000 feet of straight track cost \$2706 in 1917 and \$4677 in 1920.

Block paving between tracks and on devil strip, on straight track, which cost \$1.18 per square yard in 1917, cost \$4.95 in 1920, and is now \$5.80.

Wooden poles 35 feet long, set in place, cost \$10.15 in 1917 and \$18.50 in 1920.

Round steel poles, set in place, cost \$65.20 in 1917 and \$118.00 in 1920.

It is the duty of the Tramways Commission to determine each year the probable operating and maintenance expenses. The company must follow the commission's estimates in regard to those expenses; any expenses beyond the allowance granted by the commission and which cannot be justified must be paid by the company out of its revenues. On the other hand, if the company has kept within the operating allowance, it is entitled to an operating profit of one-eighth of one per cent. on the total average capital value for that year, that is, about \$46,000 per year.

Company Receives Fixed Sum

The company receives, out of gross revenues, a certain sum for each revenue car mile, that is for each mile travel-

led by its cars, exclusive of car-house and car-yard miles. To prevent the company from charging the public for an indefinite number of car miles, by running an excessive mileage, merely to take advantage of the allowance per car-mile, it is provided that this allowance is only given for a certain density; in other words, the company is entitled to its car-mileage allowance as long as a fixed number of passengers are carried per car mile. This year, for instance, the density is 8.5, which means that there must be 85 revenue passengers for every 10 miles travelled by the cars of the company.

The public does not generally understand the reason why a certain density must be obtained in order that the system be operated without any deficit. The majority of the travelling public goes to and from business morning and evening at about the same time and within one or two hours at most and the cars are consequently overcrowded during these rush hour periods; complaints evidently follow; the public forgets that the cost of operation is proportional to the number of cars operated and to the number of miles run; also that a tramways system must be operated as a whole and that good results on some car lines are offset by losses on other ones. For instance, in Montreal, on the St. Catherine Street line a density of 8.5 means that, although the seating capacity is 40 or 42, each car must carry 60 revenue passengers per mile, not only during rush hours, but all day. This is possible on the St. Catherine line because, while 7 miles long, it is essentially a short-haul line on which passengers keep coming on and getting off the cars in the shopping district and at the several transfer points. On other lines which reach the outlying districts the density is far from the desired figure. There are 51 different car lines or routes in Montreal on which the headway varies from 40 seconds to 15 minutes, according to traffic requirements. These lines may be subdivided into 3 classes according to their traffic density, as follows: 19 lines which may be called paying lines, with a density varying from 8.67 to 13.07; 14 lines which may be called indifferent, with density varying from 5.92 to 8.16; and 18 decidedly poor lines with a density varying from 2.01 to 4.76.

Maintenance and Renewals

In regard to maintenance and renewal, certain clauses of the contract obligate the company to maintain its tracks and equipment in good condition and to adopt new methods that may prove to be advantageous betterments and improvements to any part of its system. For instance, when unpaved streets are paved by the city, it is the duty of the company to renew the tracks already laid on those streets by the latest and most improved type of track.

Is the public called upon to pay for such betterment, and, if so, to what extent?

To the contract, and being part of it, was annexed a valuation of the physical assets of the company. In the case of any renewal, if the cost thereof is greater than the value of the same item as recorded in the valuation, the excess in value is added to the capital of the company. If, on the other hand, the cost of the new work is less than the cost of the same item as entered into the valuation, then the company must add to its physical assets new items the value of which is equivalent to the difference between the original valuation of the item so replaced and the actual cost of the renewal. No interest is paid on the value of the items added to the physical assets to compensate for any increase in the cost of replacement.

No work, either new or for renewal, can be executed by the company until it has been approved by the commission, subject to final accounting, on work orders in which

the estimated cost is distributed over the maintenance and renewal fund and the capital account.

To determine the capital value of the property belonging to the Montreal Tramways Company, the first Tramways Commission retained the services of Mr. L. A. Herdt, D. Sc., as technical adviser, who undertook to make a complete inventory of the company's physical assets and their valuation.

Valuation

This valuation was made by accounts and items as per the classification prescribed by the Interstate Commerce Commission. The total valuation of the physical assets of the company, so inventoried, amounted to \$36,286,295.00, representing the reproduction cost dependent on the condition factor selected, after investigation, for each item, at the time the valuation was made, June to September, 1917, and by extension to the date of the signing of the contract.

It must be noted that the reproduction cost of the physical assets, only, enters into the valuation, and that no allowance was made for outstanding stock or franchises. In the valuations of the Chicago, Cleveland, Detroit and Toronto systems, the value of the unexpired franchises was included. The average percentage of the franchise value to the total valuation amounted to .2325 per cent, although the Toronto franchise had only 8 years to run and some of the Chicago franchises but 18 months. In the case of the Montreal Tramways Company, some franchises were long term franchises and some even were perpetual. An estimate made by Messrs. Stone & Webster of Boston gave \$36,311,000. Another estimate made by Mr. W. F. Tye of Montreal was \$798,510 over Mr. L. A. Herdt's valuation, and the same estimate, based upon the overhead expense adopted by the Chicago Terminal and Subway Commission, was \$2,205,100 over Mr. L. A. Herdt's valuation.

The company never admitted the valuation as representing the real worth of its physical assets.

In its last annual report, published in 1920, it shows a difference of \$4,594,627.17 between the capitalization upon which the citizens of Montreal have to pay an interest of 6 per cent. and the value fixed by the company as being the actual worth of its system. The company, in signing the contract, accepted the value as being \$36,286,295.00, relying on that clause of the contract whereby in case of expropriation, at the expiration of the present contract or at the expiration of every subsequent five year period, the contract valuation should not bind the arbitrators in establishing the purchase price payable by the city.

To the capital value, as determined by the valuation, is added, each year, the value of all additions to the physical assets of the company. The latter is entitled to a return of 6 per cent. on its capital value. An additional interest of 1 per cent. was paid on all additions made during and for two years following the war.

Six per cent. on Working Capital

The company receives also 6 per cent. interest on its working capital. For the purpose of financing, that is to cover the expense of securing additional capital to pay for extensions, renewals and additions, the company receives annually, out of gross revenues, a fixed sum of \$181,431.37, equivalent to one-half of one per cent. of the capital value as determined in the contract.

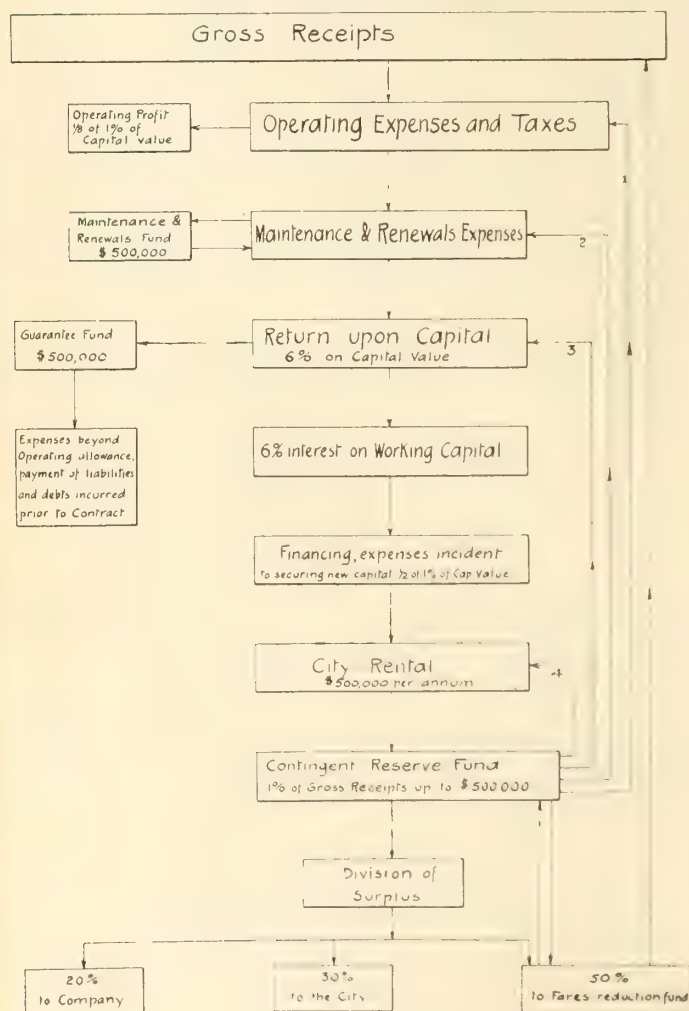
It may be mentioned here that, in the case of a renewal, although the item of property replaced be exactly the same as it was at the time the valuation was made, the fact that materials and labor necessary to make this renewal cost more than they did, compels the company to capitalize this increase in cost instead of charging the entire cost of renewal to the maintenance and renewal fund.

They who have followed the market fluctuations will know what might have cost the raising of a loan of three or four million dollars necessary for extensions and renewals when the Tramways debentures were quoted 65.

Next to the above fixed charges comes the rental of \$500,000.00 which is to be paid annually to the city of Montreal; then the contingent reserve fund into which one per cent. of the gross revenues must be paid annually until it amounts to \$500,000, this fund is to be used whenever it may be necessary to make up any deficiency in either of the following charges, and in the following order: (1) operating expenses and taxes, (2) maintenance and renewal charges, (3) return upon capital value, (4) city rental.

Disposition of Surplus

Any surplus of the gross revenues over the payment



The distribution of receipts

of all the above charges is to be divided into three parts as follows: 30 per cent. to the city, 20 per cent. to the company and 50 per cent. to a toll reduction fund, the object of which is to reduce the passage fares on the tramways.

The contract provides that the commission may reduce these fares when the reduction fund has reached an amount of \$1,000,000, and must reduce them when it has reached \$2,500,000.

These amounts may, at first sight, appear rather large, but they are not too high if it be considered that a reduction of half a cent per fare represents about \$1,000,000 per year and that the greater the number of passengers, the greater will be the total reduction.

Out of its own resources, the company must provide a guarantee fund of \$500,000, payable in yearly instalments, and, in any case, within five years from the coming into force of the contract. This fund is to be used to meet all liabilities, except mortgage debts, incurred by the company prior to the contract and to provide each year for the payment of any unnecessary expenditure, and to guarantee the fulfilment of all obligations assumed by the company under the contract.

The accompanying diagram shows, at a glance, the disposition of revenues into the several funds created by the contract.

Advantages of System

From the above explanation it may be seen that the citizens of Montreal have all the advantages of municipalization without its drawbacks. The city has nothing to pay for the operation or maintenance of the tramways system, no money to raise or loan to finance for its development or extension; the results obtained lately in the United States and in Canada by municipal or state ownership of railways are far from encouraging. It may be argued that the company receives annually a little over two million dollars as interest on its capital value. But, on the other hand, to what would have amounted the annual interest on debentures issued by the City of Montreal in payment for the purchase of the Montreal Tramways Company under clause 210 of the old charter? And what would have been the amount to be paid for the purchase of the several existing franchises?

As it is, Montreal pays for what it gets and has the lion share of any surplus that may be forthcoming. The commission acts as a controlling agent on the company and sees that the provisions of the contract between the city and the company are carried out. Its decisions may be taken for appeal to the Quebec Public Utilities Commission.

By the contract, the Island of Montreal is divided into two territories: 1st, the Uniform Tariff Territory, so called, in which are included the city of Montreal, the towns of Maisonneuve, Westmount, Outremont, Verdun and part of St. Laurent and Cartierville; 2nd, the outside territory in which are included all the other places of the island served by the tramways.

Twenty Miles for One Fare

A passenger boarding a car at the eastern limits of Montreal East and who goes to Cartierville can ride a distance of nearly 20 miles for one fare. This example alone gives an idea of the area of the uniform tariff territory. The total area of both uniform tariff and outside territories is about 67.9 square miles, out of which 60 square miles are uniform tariff territory. The total revenue single track mileage serving both territories is 246.03 miles. This may be used as a basis of comparison with Toronto, where the area served by the Toronto Transportation Commission is but 17.07 square miles with a revenue single track mileage of 129.6 miles. At the same time the number of revenue passengers carried in Montreal per mile of track in 1919 was but 752,425 against 1,407,581 per mile of track in Toronto, giving in Montreal a revenue of \$35,479.11 per mile, against \$55,838.59 in Toronto, whilst the operating and maintenance expenses for the same year were \$6,669,340.68 in Montreal and \$5,655,658.57 in Toronto. This condition is due to the fact that the "riding habit" is lower in Montreal than in the other large North American cities, as shown in the following table:

Manhattan, 388; Toronto, 365; Detroit, 360; Chicago, 334; Cleveland, 325; Brooklyn, 265; Pittsburg, 230; Montreal, 225.

According to street railway economics, there should be

in any great city a minimum average of one ride per day per capita. This would give for Montreal approximately 280,000,000 revenue passengers per year, which is far in excess of actual results.

The revenues of the company are derived from the passengers as well as from freight carrying, advertising, etc.; however 98 per cent. of the revenues come from passenger transportation.

Fix Fares Annually

It is the duty of the Tramways Commission each year to fix the fares. After estimating the probable expenses per car mile and fixing the density, dividing the one by the other gives the tariff necessary to meet all operating, fixed and maintenance charges. At the present time the fares are as follows:— 7 cents cash or 4 tickets for 25 cents, or in books of 50 tickets for \$3.00; school children's tickets, 7 for 25 cents. The fares for the outside territory vary according to zones based on distance and localities.

The returns for the month of October, 1920, have been chosen as being those of the first month really typical of conditions since the last tariff was adopted. It gave for the Uniform Tariff Territory a total of 15,690,105 revenue passengers and for the Outside Territory 629,035 revenue passengers; this gives a revenue of \$975,424.21 for the Uniform Tariff Territory and \$18,811.81 for the Outside Territory, that is an average fare of 6.22 cents for the former and 2.99 cents for the latter, an average fare of 6.09 cents. And yet it may be mentioned here that this comparatively low fare is already the third increase in fares since 1918. Many people think that these successive increases meant increased profits to the company, whilst they are merely adequate to cover the actual expenses.

It may be interesting apropos of the fares now prevailing in Montreal to show what the conditions are elsewhere. The following table is a summary of the number of cities with tariffs in force at the end of the years 1917, 1918, 1919 and 1920, respectively, in 288 cities of the United States with a population of 25,000 or more:— 10 cent fare, 1919, 25 cities; 1920, 57 cities. 9 cent fare, 1919, 1; 1920, 4. 8 cent fare, 1918, 12; 1919, 12; 1920, 23. 7 cent fare, 1918, 33; 1919, 64; 1920, 89. 6 cent fare, 1917, 25; 1918, 78; 1919, 73; 1920, 61. Central zone with additional fare, 1917, 1; 1918, 13; 1919, 4; 1920, 2. 5 cent fare and pay-transfer, 1917, 1; 1918, 8; 1919, 4; 1920, 1. Uniform zones, 1917, 4; 1918, 6; 1919, 14; 1920, 11. 5 cent cash fares, 1917, 5; 1918, 27; 1919, 20; 1920, 18. 5 cents (without any increase), 1917, 264; 1918, 123; 1919, 83; 1920, 34.

Other statistics show that for cities of 50,000 inhabitants or more, since 1913, the average fare which was 4.8425 at the end of that year was 7.1762 cents in 1920. The average in Montreal is but 6.09 and it must be borne in mind that the above statistics were taken in American cities, which operate under better conditions than obtained in Montreal. Most of the railway materials used here come from the United States, which means an increased cost of at least 35% ad valorem for customs duty, to which must be added freight from Pittsburgh, Philadelphia, Cleveland or Chicago, and, for the last eighteen months, from 10 to 15% for difference in exchange rates. To this must be added the unusually high cost of snow removal, which is generally low in American cities. The snow removal cost the Montreal Tramways Company \$263,790.92 in the winter 1919-1920; it is a provision of the contract that the tramways company pay one-half the entire cost of snow removal on all the streets on which its tracks are laid.

According to its last annual report for 1920, the Montreal Tramways Company paid a dividend of 10% to its

stockholders. It is generally believed by some of the public that this dividend is guaranteed by the contract. This is wrong; the only return guaranteed by the contract is an interest of 6% on the capital value of physical assets, determined by the valuation, as explained above. How then can it be possible for the company to receive 6% on its capital and to distribute a 10% dividend?

Dividend Not Guaranteed by Contract

A study of last year's operations will dispel this seeming anomaly.

Capital Value—Capital value as fixed by contract, Jan. 1st, 1918, \$36,286,295.00; additions to June 30th, 1919, \$712,184.97; additions from July 1st, 1919, to June 30th, 1920, \$504,052.50; total capital value to June 30th, 1920, \$37,502,532.47.

Interest on Capital Value—6% on \$36,286,295.00 to June 30th, 1920, \$2,177,177.70; 6% on working capital, \$23,832.96; 7% on additions to capital, (a) additions to June 30th, 1919, \$49,989.53, and (b) additions from July 1st, 1919, to June 30th, 1920, \$19,837.93, \$69,827.46; total, \$2,270,838.12; operating profit, \$46,606.68; net total, \$2,317,444.80.

This amount, \$2,317,444.80, received by the company must serve first to pay any of its debts or liabilities that may exist and if there be any surplus left, it may be distributed as dividend.

The paid capital stock of the company amounts to \$3,880,240.00. The other liabilities are as follows:—Debtenture stock, \$17,000,000.00; 5% First and Refunding Mortgage Gold bonds, \$16,335,000.00; Underlying 4½% bonds, \$3,273,153.44; Mortgages, \$843.00; total, \$36,608,996.44.

It is to be noted here that, while the company receives 6% return on its capital value, it pays only 4½ and 5% interest on its stock. This accounts for the margin which is left and can be distributed as dividend, as shown below:

Revenue

Allowance from contract, \$2,317,444.80; other revenue, \$58,134.78; gross revenue, \$2,375,579.58.

Expenses

Interest on bonds, \$1,044,169.20; interest on debentures, \$850,000.00; other expenses, \$28,902.25; total expenses, \$1,923,071.45. Net income, \$452,508.13.

This net income enabled the company to pay a dividend of 10% on its capital stock of \$3,880,240.00. If, however, the company had to borrow, in the future, at 7% or 8%, the result might be quite different.

The following statistics, taken from the Commission's second annual report, 1919-1920, may be interesting:—

General Statistics

Total length of tracks, 264.40 miles; length of tracks in operation, 246.03 miles; gross receipts per mile of total tracks, \$40,750.07; gross receipts per mile of tracks in operation, \$43,825.83; gross receipts, \$10,782,470.09; operating expenses and taxes, \$5,896,518.57; maintenance and renewal expenses, \$2,190,557.43; percentage of gross receipts devoted to operating expenses and taxes, 54.68%; percentage of gross receipts devoted to maintenance and renewals, 20.32%; percentage of gross receipts devoted to total operating expenses, 75%.

Transportation

Total number of passengers, 255,685,986; revenue passengers, 191,941,835; transfers, 63,744,151; percentage of transfers to number of revenue passengers, 33.21%; gross receipts per passenger (total), 4.22c; gross receipts per revenue passenger, 5.62c; receipts per passenger

(transportation of passengers only), 5.51c; total operating expenses and taxes per revenue passenger, 4.21c.

In regard to power consumption, the latest returns for March and April, 1921, were as follows:—K.W.H. total, March 9,274,601, April 8,491,128; car hours, March 216,253, April 210,380; car miles, March 1,853,890, April 1,811,026; K.W.H. per car hour, March 42.8877, April 40.3609; K.W.H. per car mile, March 5.00277, April 4.68857.

The above consumption per car hour and per car mile is, of course, an average, the load varying during the day according to requirements; while there are but 5 cars in service at 4 a.m. and 27 at 5 a.m., there are 542 at 8 a.m., with an average of 76 cars from 1 a.m. to 6 a.m. and 489 for 6 to 9 a.m.; from 10 a.m. to 4 p.m. the average number of cars in service is 321; the average from 5 to 7 p.m. is 598, while at the peak load, i.e., at 6 p.m., there are from 725 to 740 cars in service; from 8 p.m. to midnight the load is pretty regular, with an average of 245 cars in service.

There are three sources of power, to wit:—two hydro-electric sources, the Montreal Light, Heat and Power Company and the Public Service Corporation; and also steam generated electric power. The latter is only used at times, as a booster, during peak load periods; it is, however, an expensive way of obtaining power, and the aim of the Commission is to do away with it altogether. The construction of a new sub-station at Cote Street was started with this end in view; it will, meanwhile, do away with an appreciable drop in voltage by bringing the point of distribution to the centre of gravity of the maximum load during rush hours.

Rearrangement of other sub-stations, better spacing of stops, facilities for quick loading and unloading, increased speed, revision of routes, improved track construction and track bonding are all questions receiving the attention of the Tramways Commission, with the hearty co-operation of the company, to improve service and to reduce the cost of operation.

Modern Electric Railway Service in Larger Quebec Cities

Quebec Province has its fair share of electric railway systems, and in their operation and maintenance has been very much up-to-date. The bugbear of the "Northern Winter" has no dread for the Canadian operator, and schedules are now maintained under the most unfavorable weather conditions. Indeed, it is only from such southern cities as New York that one hears nowadays of tie-ups due to frost and snow. This is largely for the reason, no doubt, that Quebec railway companies long since realized the importance of the snow problem and made a special study of it.

The city of Montreal has one of the most modern transportation systems on the continent. Its solution of the rate question has been discussed from Coast to Coast. The supervision of this system is in the hands of a Commission, for whom the company may be said to merely operate. The success and smooth working of this arrangement is explained at length in a most interesting article in this issue by Mr. Paul Seurot, the Commission's chief engineer. As Mr. Seurot puts it, it is the "function of the Tramways Commission, with the hearty co-operation of the company, to improve service and to reduce the cost of operation." The former they may be fairly said to have

accomplished already and the latter will, doubtless, follow in the natural course of readjustment of prices now taking place.

The cities of Quebec, Sherbrooke, Three Rivers and Hull also are well served by electric railways. The Quebec Railway, Light, Heat & Power Company not only operate an efficient city and suburban railway service but also generate their own energy and distribute it to the citizens for lighting and power purposes. An article describing the operations of this company is printed elsewhere in this issue. Due to ample power supply and enterprising management of the various public utilities, the City of Quebec is developing very rapidly industrially.

The Sherbrooke electric railway was recently purchased by the Southern Canada Power Company and is now operated as part of this company's large system, on the same progressive policy as their power generating and distributing departments. Sherbrooke, also, is growing rapidly industrially and offers unusual attractions to industries, as is evidenced by the numerous manufacturing firms that have already located there.

The Three Rivers Traction System is probably one of the most modern on the continent. It is owned by the Shawinigan Water & Power Company and operated as one of their subsidiaries. All the cars are the latest one-man safety type, specially adapted for giving a more rapid and frequent service in a city of moderate size.

The Hull Electric Company also combine the operation of a city and suburban railway system with a supply of light and power. This company generates power from the Ottawa River. Their suburban lines serve one of the most attractive rural districts in the country.

The Montreal and Southern Counties Railway System, operates, as its name indicates, in the counties south of the Montreal Island. Their equipment is up-to-date and their service has done much to develop the district served.

Nor must it be forgotten that the province of Quebec was the first in Canada, and one of the first on the Continent, to break away from the standard 550 volt electric railway operation and equip a system for operation at 1500 volts. The C.N.R. terminals in the city of Montreal, and through the Mount Royal tunnel, have been operating successfully at this voltage for a number of years.

Municipal Ownership not Popular in Quebec

The Province of Quebec differs from all other provinces of the Dominion in that municipal ownership, i.e., the development and control of natural resources by public, rather than private, finances, is almost unknown. What the reasons may be for this condition it is not easy to determine, but it is, at least, evident that private capital appears to have been exceedingly aggressive, eminently fair and reasonable, and always available where the conditions of the demand appeared to offer a reasonable return on investments. The city of Sherbrooke is practically the only instance of a municipality endeavoring to operate its own electric utilities. During the recent industrial boom, when the demand for electric power was abnormal and when certain other provinces suffered from an under supply, the Province of Quebec was in the fortunate position of being able to add rapidly to plants already existing and so were able to keep pace with the increased demand. For this reason, they were so equipped as to be able to court prospective industries, either new or branches, from foreign countries, rather than spurn the advances as other localities were forced to do. This has, undoubtedly, given Quebec a good lead industrially—a lead which, from all indications, she is determined to maintain.

Relation of Electrical Power to Industrial Development

By P. T. DAVIES, Commercial Manager Southern Canada Power Co.

Industrial development in this Canada of ours must go hand in hand with the toil which steadily eats into the long fallow-land lying north of the 45th parallel, turning it from wild nature to what has been called prophetically the granary of the British Empire.

While pure economics might at one time have indicated Canada as a land for agriculture alone, the fallacy of putting all one's eggs in one basket (the bread basket), coupled with the enormous water powers available, have rightly changed this conception so that today Canada produces everything that Great Britain produces, and many things in addition that she cannot.

Today the city market is by far the most important for the mixed farming population of the Province of Quebec, and for the continued development of the province it is essential that many towns grow where blades of grass grow today, and that the towns of today become cities of tomorrow.

Canada today is the easiest place in the world where development can take place, and the Province of Quebec is practically a virgin field for this development. One of these days someone will discover Quebec in reality, and there will be a feverish rush from comparative adolescence to vigorous manhood; in the meantime the infant is healthy if somewhat sleepy.

The Province of Quebec is well blessed with godfathers, both spiritual and material; the former, mostly in the hands of the Roman Catholic Church, guarantees an atmosphere of work combined with pleasure, of plenty without license; the latter, noble rivers emptying comfortably into the St. Lawrence from the height of land on either side, provides a nest-egg of some four to five million horse power in perpetuity for the comfort and progress of its godchildren.

The genesis of most towns in the Province of Quebec has been a settlement around a water power. Usually a planing mill, a grist mill and perhaps a wool-carding machine have been installed for the surrounding farming trade, and to these have been added slowly our usual urban structure of retail stores, banks, courts of justice, etc.

Almost all towns excepting the ports on the St. Lawrence river have been so formed; examples are:—Drummondville, St. Hyacinthe, Sherbrooke, Magog, Farnham, Granby, Rock Island, Coaticook, St. Therese. More recently, the great development of the pulp and paper industry has been the cause of a number of new towns which would never have come into being without the water power existing at their doors.

Most of the water power development in the days when these towns sprang up, was of the obvious kind,—a small wooden dam, often only a catch basin for a part of the river, a wooden flume, a cumbersome water wheel of perhaps 20% efficiency and 50 or 100 h.p. sent back the farmer with his sawn lumber, ground moulie and spun yarn.

Then arrived King Electricity, and the miller became a prospect for a dynamo, and there appeared in his mill and in the settlement around, the products of Edison, joy at eventide and easy money for the miller.

Then some of the larger settlements appeared as gold mines to those who knew, and millers were expropriated,

their water powers submerged, and electricity, the servant of man, began throwing dams right across rivers, changing the face of nature.

It is on record that one of the first three-phase, alternating current plants on the North American continent, perhaps therefore in the world, was installed at St. Hyacinthe.

Electrical power as an aid to industrial development was not active until 1910. In the days of cheap coal, electricity, whether generated by water power or by steam engine, was only a competitive medium for the development of power and considerable work had to be done before power users could be converted from the use of steam power to electrical power generated outside their control, the only real industrial development that could be traced to the use of electrical power at this time, being the carbide, aluminum and carborundum plants at Niagara and Shawinigan Falls. Most of the endeavors of the power companies to that date were confined to persuading existing manufacturers to take advantage of electrical drive.

Around this time, the advantage of the ability to purchase small amounts of electrical power, led to considerable diversification of its use, and no doubt also enabled many small manufacturers, more especially in the clothing trade, to start up a business on a very small capital investment for power apparatus.

Until 1913 and 1914, it will hardly be a fact to state that the introduction of electrical energy as a source of power had done much to aid industrial development. The coming of the war, however, bringing in its train tremendous demands for all kinds of products, created a demand for power in all parts of the country, and the availability of electric power made possible over-night the creation of large industries which otherwise would not have been possible. Again, the high price of coal and the extreme difficulty of obtaining it at any price at all, naturally swung industries to locations where power was available.

Numbers of large electrical furnaces for the production of shell steel were put in operation in confined districts where the ordinary steel plant with open hearth and Bessemer furnaces would have been an impossibility, and electric power became at once the arbiter in the matter of the location of industries.

The Province of Quebec is extremely favorably situated as regards the supply of electric power. In the history of the province to date, there has been no shortage whatsoever of electrical power, even during the peak demands of the war period. The water powers are practically all privately owned and privately operated and due care and prudence has been used so that the electrical power supply has at all times been so adjusted as to comfortably take care of the requirements.

On the other hand, the industrial development of the province outside of Montreal, the largest manufacturing centre of Canada, has been very much delayed. The reasons for this delay are principally lack of capital in small centres, innate modesty, and the fact that the people of the province have been contented with things as they are. As a result of this, over two million French Canadians have emigrated from Canada, mostly to the New England States, and today in

towns such as Lowell, Nashua, Pawtucket and others there are more French Canadians than U.S. citizens.

There has apparently fallen on the shoulders of electrical power companies in the Province of Quebec, the duty of rectifying this condition, by providing, at once, work for the population and a market for their power development. This work of attracting industries has, in the case of Ontario towns, mostly been carried out by the towns themselves; in the case of Quebec towns, the absence of active Boards of Trade or equivalent bodies has left the work absolutely undone, with the result that the smaller Quebec towns excepting Sherbrooke, have practically stood still until the last three years. During these last three years a marked impetus has been given to smaller towns in Quebec by the propaganda which has been carried on with a view to inducing new industries into them.

The towns themselves offer many advantages, the principal one being that of labor, which is not unionized outside of Montreal, and as a result, ample labor is obtainable at rates which are from 25% to 50% lower than has to be paid in Ontario towns. Furthermore, the labor is accustomed to working ten hours and more per day. The labor is very adaptable, being mostly brought up on farms, is accustomed to the use of tools and is hardy, equable by temperament and with a settled philosophic turn of mind and will accommodate itself to repetition work without undue fatigue.

The labor also is conscientious, honest, not of the clock-watching type and is interested in production. There are no failures on record of the adaptability and intelligence of the French Canadian, who is the main artisan of the Province of Quebec. A labor force that is free from strikes or disturbances, not subject to excitement by foreign and international delegates, mostly interested in winning for itself homes and the means of support for the large families which are the rule and not the exception, is in these days of labor unrest something to be proud of. The Province of Quebec can well be proud of its ordered and sane population which makes it one of the safest places in the world today to recruit a loyal and efficient organization.

In the matter of sites for industries, the province is also particularly well favored; most of the land is reasonably level and building problems are not difficult; all materials, bricks, wood, cement, etc., are obtainable locally and any amount of skilled labor for the erection of factories of any kind can readily be found.

The province is literally grid-ironed with railroads, and there is no difficulty at all in obtaining excellent sites of almost any size adjacent to railroads with ample labor in the vicinity already housed.

It was therefore with a firm hope of success that some of the more widely distributed electrical power companies in the province decided that it was their duty and opportunity to place the unexcelled advantages of the province before British manufacturers. The results have been excellent for the short time during which this work has been carried on. Many new industries have been established in the smaller towns to the complete satisfaction of all concerned. Today the trail from New England manufacturing centres is direct to the Province of Quebec and except for a temporary cessation during the last six months of difficult times, the path has been rapidly beaten down and the country side is echoing to the sound of contractors' equipment while various of the towns can point with pride to million dollar factories in their midst.

The growth of any community, as Sir George Foster recently said at a meeting in Montreal, depends entirely upon the initiative of the people interested in the town. There is

as a rule no particular reason why any one town should progress and another stand still, excepting that in the first town there are found progressive business men who need the expansion of the town for the expansion of their own interests. This interest has been lacking in the past in Quebec for temperamental reasons, but with the addition of the outside initiative supplied by the power companies, this deficiency has been more than filled.

The erection of one good factory in any town brings with it a number of able men whose surplus energies, acting beyond their immediate business, create a spirit of growth which is going to mean much to the Province of Quebec.

Behind the natural advantages of the province lies the fundamental attitude on the part of the Provincial Government which guarantees its future success. The Provincial Government of Quebec is known as the most sane government in Canada. Private enterprise is assured, at all times, of fair protection, and individual liberty is also guaranteed by reason of the racial problem which must permit two races of somewhat different temperaments, to live and let live in peace together.

In good roads also the province is so far ahead of any other part of the Dominion that no comparison is possible. There are thousands of miles of improved roads existing today and thousands more projected all under the wing of the Provincial Government, which is loaning the money to the municipalities at a rate of interest, namely 3%, which can only be considered insignificant.

The building of storage dams when required for the betterment of the flow of the various rivers which can be utilized for power development, is a further example of the responsible sense of the Government, and the small amount of the provincial debt per capita compared with those of the other Canadian provinces shows also the economical manner in which the Government carries out its duties.

The most marked cases of the relation of electricity to industrial development are the cases of the progress obtained in this direction by the Shawinigan Water and Power Company and the Southern Canada Power Company. The town of Shawinigan Falls is an example of a community of some 20,000 people created practically in the backwoods, solely on account of the development of water power and the further creation of industries to use water power in the form of electricity.

The Shawinigan Water and Power Company sells today some 60% of its enormous output amounting to over 230,000 h.p. to industries which it either created or induced to locate in its territory north of the St. Lawrence river.

The Shawinigan Water and Power Company, besides its main development around its power plants where enormous blocks of hydro-electric power at low cost are taking the place of other forms of energy, has extended its lines into practically all the towns between Quebec and Montreal on the north side of the river St. Lawrence, and has by its advanced industrial activity been able to locate in many of the towns in this area, excellent industries, proving the turning point in the development of these towns.

In the same way Southern Canada Power Company operating in the territory between the St. Lawrence river and the U.S. border, an area of some 10,000 square miles, lying alongside the New England states, has been able recently since the development of one of its main power plants at Drummondville to induce manufacturers to become the "king-pins" in various towns which it supplies. Without doubt these towns would have stayed in exactly the same condition as they were five years ago had it not been for the foresight

and courage of this company in making available at all points on its system, power supply ample for large industrial needs.

Quebec is unfortunately void of commercial coal seams and while it is close to the Nova Scotia fields the handicap of a fairly long transportation seemed likely in the days of steam generated power to act as a permanent drawback. The development of its water powers, however, has solved this problem and with the very high cost of coal today caused mainly by transportation expenses, electric power has unquestionably become of supreme value to the industrial plant.

This is only the beginning of this industrial development. The raw materials, natural advantages, railway facilities, rich agricultural country, have been there for generations but due to lack of a directing force, the children of this part of the country have had to either increase the rapidly growing population of Montreal or emigrate to the New England States. We need all these fine young men and women in our country, and the only way to keep them is to provide them with employment.

One of the most remarkable features of the industrial campaign of the Southern Canada Power Company has been the splendid way in which the townspeople in the various towns have responded when the opportunities of obtaining new industries have been presented to them.

While at one time the laws of the province permitted the giving of bonuses, tax exemptions, etc., to new industries, the unfortunate condition which this created in some of the towns which were exploited by mushroom financiers, finally caused the Provincial Government to enact laws preventing such gifts.

The towns therefore have had to appeal to manufacturers entirely from the standpoint of their intrinsic worth as manufacturing sites and it has needed the outside energies and general broad knowledge of an industrial expert to gauge these possibilities and not only to convince the incoming manufacturers but often the townspeople themselves of the value of the wares which they have to sell.

The people of the Province of Quebec are now fully awake to the desirability of obtaining industrial development, and the example of the old countries like Great Britain, Belgium and France, where every town and also every village has at least one good manufacturing plant, is bound to be duplicated here.

The success which has attended the efforts of the power companies in providing this employment is but an earnest of what will be done in the future; in this sense electrical power has been absolutely the father of the recent industrial development in the Province of Quebec.

Hydro-Electric Power Securities as Investments— and Why

By H. E. FLOOD, Nesbitt, Thomson & Co., Investment Bankers.

Next to the obligations of municipalities, which are a lien on the taxing power of a community, come the mortgage obligations of public utility companies. In fact the mortgage obligations of one branch of the utility companies, that is, hydro-electric companies, have a record in Canada which may be envied even by our municipalities. There has been no default on the mortgage obligations of any Canadian hydro-electric company of any moment with one exception (not in Quebec province), and that default was for two years, the interest being paid in 7% debentures, so that eventually the investor will not sustain any loss.

In buying an issue of securities the first point that an investment banking house must be convinced of is that the product of the company whose securities they are about to buy is an **essential** product. A business supplying to the public such necessities as electricity, street railway service, telephone communication and gas, is most certainly an essential service. You only have to consider how lost you would be without them to realize just how essential they are.

The development of hydro-electric power means the development commercially of the territory which it serves. To quote from an advertisement of a prominent electrical equipment company—which I think brings out a point which is often times missed:—

"There is a certain broad valley in this land where till recently business was poorer than a church mouse, and the cost of living higher than folks liked to think about. Therefore some merchants and artisans and farmers met to find the remedy.

"Said the farmer, 'If the electric power plant only reached out my way, I could irrigate a hundred acres more.'

"Then I'd build you a new barn,' a carpenter replied.

"Said the real estate man, 'I've fifty building lots nobody will buy, because I can't get electricity there.'

"Think of the furnishings I might sell to fifty homes,' sighed a department store man."

Electric light and power—that was the need.

The Government of the Province of Quebec has recognized the importance of hydro-electric development to the province, and has, through wise and far seeing legislation, assisted materially in the development of the provinces' hydro-electric resources.

Estimates have been made that for each horse power of hydro-electrical energy developed it will give direct employment to one man; indirectly, through purchases and expenditures five persons will be supported by the production obtained through the development of each h.p., and for each h.p. of hydro-electrical energy produced statistics prove that at least \$1,000 is expended in industrial development.

Of the public utilities we believe that the water powers of hydro-electric companies occupy the premier position. It is hardly necessary to comment on the use of electricity—its use is growing enormously both for domestic and commercial purposes. Coal as a source of power is becoming less abundant and more expensive, and there is a very marked tendency on the part of all large industrial concerns to locate where electrical power generated from water is available, because of its greater economy in most cases, and the dependability of supply.

The industrial development of Canada is inseparably tied up with the utilization of her great water powers. In the markets of the world industrial supremacy lies with the nation that can produce most economically for export. As a dependable and economical source of power is a very important factor, it can be realized how important is the de-

velopment of Canada's great water powers to her industrial life. Another point which is interesting is the fact that the creation of the product of a hydro-electric company does not deplete the assets of the company; it is merely a conversion of a natural resource which otherwise without development would be going to waste.

Some of the points with regard to the desirability of an investment in hydro-electric securities can be best brought out by comparison. With a great majority of industrial companies, due to the nature of their business, their earnings will fluctuate materially. The study of such companies' earnings for ten years will show that this is quite true. The saying, for instance, with the steel trade is that "business is either a feast or a famine." The same is true of a great many other industries; in times of prosperity their earnings may be abnormally large, then again in times of depression their earnings will be adversely affected. In such periods of depression, owing to poor earnings, the companies' securities are bound to be affected. Periods of prosperity and depression do not affect the hydro-electric companies to the same extent, more particularly so if the power company's load is diversified and not entirely an industrial load. In times of prosperity their earnings may not increase as quickly as those of an industrial company, but on the other hand in times of depression their earnings will not be reduced to the same extent. The earnings will show, as a general rule, a fair increase over a period of years.

One of the great dangers of industrial enterprises is that of over expansion, which comes usually in times of great prosperity—the depletion of working capital and overloading of the company with fixed assets, which fixed assets in times of business depression are non-productive. This situa-

tion is almost impossible with a hydro-electric company when once established. Its initial cost is the big cost, and if the plant is constructed on a reasonable basis this danger can be avoided, and has been with Canadian companies with but very few, exceptions, and these exceptions could also have been avoided by ordinary business intelligence. A great many industrial companies today are suffering due to the fact that they have had to take heavy losses on inventories. This situation comes around in cycles—it has come before and it is bound to come again in the future. Also there are times when credits cannot be liquidated quickly; in this respect power companies are in a particularly favorable position—they have practically no inventories and their business is on a cash basis.

If a power company is well situated and serving its territory fairly, the problem of competition is not one that need give them any concern. On the other hand there are very few industrial concerns that can ignore competition. Power companies are also practically free from the troubles which are bothering a great many industrial concerns today, namely, labor and transportation.

A great many investors are too prone to judge a company's security entirely upon its past earnings. Today, after the abnormal earnings during the war period, it is a very unwise method. What the investor really is interested in is their earning capacity in the next five years. It seems to be the general belief that the hydro-electric power companies are on the eve of a great development and they are in the fortunate position that while their earnings for the past five years have been particularly bright, the prospects for the next five or ten years are even brighter.

The Heart of the Bell Telephone System

*Over 100,000 miles of wire and investment of over \$60,000,000 in Canada—
Long Distance Service Revolutionizes Business*

To the Province of Quebec and, more particularly, to the City of Montreal, fell the honor of being the home and nerve centre of that development of the electrical industry which has resulted in the present Bell Telephone System in Canada. For we must bear in mind that however attractive the telephone enterprise may appear today as an investment with an assured future, there was a time not so very many years back when were needed vision and faith to see the possibilities of a system of spoken communication by electric energy transmitted over wire.

To the men of that day who saw something of what the telephone meant for future decades and who backed their judgment by a modest investment there has come as a result of that faith, no great fortune, to be sure, but a steady and reasonable return, with the satisfaction of knowing that, among many doubters, they judged aright and had the courage to back their judgment. They have seen uninterrupted progress in a field in which there were no precedents to guide, no handy precepts as a result of past experience. Indeed, it is nothing short of remarkable that in the development of an ever-changing art over a period of more than 40 years during which the public has been asked to contribute less, for service rendered, than anywhere else in the world, there should have been no costly mistakes, no disastrous moves, no periods of "drouth" as a result of unwise policy.

Abreast of Invention

And further, not only has the development and extension of the telephone kept pace with the needs of the communities

it served, but each proven advance in the telephone art has been promptly adopted and placed at the command of users of the service. In both the local and long distance field, the cumulative results of improvement great and small have been quickly made available to patrons of the Bell System, the outcome being that no really effective device that meant better service to the whole community has long been absent from its equipment.

Add to the above the fact that in all its dealings with public bodies—municipal councils, legislatures, etc.—as well as in phases of its financing, there has been a most scrupulous regard for faith-keeping and fair dealing, and you have what is truly an enviable record.

As we said at the beginning the Province of Quebec and the City of Montreal have reason to be proud that they are the nerve centre of the telephone development of Eastern Canada.

Long Distance

To say that at December 31st, 1920, the Bell Company, in its territory of Quebec and Ontario, had 102,187 miles of wire on 9,549 miles of pole line tells only a small part of the long line story! By the adoption of all approved devices for insuring perfect transmission—loading coils, repeaters, etc.—the talking qualities of the long lines are superb. As a result subscribers in Montreal and Ottawa have talked with perfect satisfaction to far-away Los Angeles, Vancouver, New Orleans, Dallas and Havana. By the despatch method of long line operating, traffic is speeded up to such a degree that

busy men find themselves saving time that formerly was pure waste. All that makes for economy of working hours for the hard-pressed executive is offered by the splendid long distance equipment and methods of the Bell traffic forces.

Local Service

As an evidence of faith in the future of the territory it serves, the Bell company's 81 buildings throughout Quebec and Ontario are an impressive part of its assets. A fine substantial structure, as nearly fire-proof as it can be made, the telephone building is a landmark in all the principal towns and cities of the two provinces. From these, and the rented premises it occupies in the smaller places, the company was serving on December 31st, 1920, 376,361 telephones.

Splendid co-operation with municipal authorities is indicated by the fact that over 2,400 miles of underground duct have been put in, carrying over 640,000 miles of wire. Getting its poles off city streets has cost the company many thousands of dollars, without adding anything to its revenues, and yet the accommodation to patrons is considered well worth while.

Farmers' Lines

In the light of new conditions surrounding a rapidly growing business, it is a matter for congratulation that the Bell Company was broad enough to adopt a policy designed to encourage local companies in building their own lines. They were given expert assistance, and instead of regarding them as competitors, the company actively sought their co-operation in the great work of fully developing the telephone industry and in giving what may be called a universal service, whereby any subscriber may speak to any other subscriber of the Bell system, and through its connecting arrangements with practically any subscriber in the United States.

In February, 1907, the Bell Company issued a circular to its local managers which stated that—

"Owing to the heavy demands made upon the company during the past two years for the construction of lines to serve farmers and others living in the less populated districts, a plan which should be satisfactory to the farmers and profitable to you has been devised, which it is hoped will meet the requirements. This plan, in order to become effective, will require the earnest co-operation of our local managers throughout the country, and we would, therefore, suggest that you carefully study the territory tributary to your office and ascertain if it will be possible to arrange for the construction of telephone lines to serve this territory, such lines to be owned and maintained by the parties interested. Take each road radiating from your office and ascertain whether a sufficient number of people cannot be got together to form a club to build a line to terminate at your switch."

Results Accomplished

This policy was at once entered upon by Bell managers, and the spirit of it is still adhered to. Its results are seen throughout the territory in the splendid development amongst the farming communities. The Bell company continues to actively assist in the formation of new companies to operate in undeveloped districts. The engineering, plant and traffic departments have been glad to give assistance in the building and operation of these systems, and the big company now connects with 742 rural companies in Quebec and Ontario which have over 112,000 subscribers. The Bell company has over 32,500 rural subscribers of its own.

Competitive Situation

The majority of competitive situations have been cleared up, and the policy of the company has been to make any reasonable arrangements which will eliminate duplication.

Two telephone systems mean economic waste, as well as an unnecessary inconvenience.

The Workers

Taking employees by and large, there is no more loyal and faithful body of workers anywhere than the 12,300 Bell Telephone family. They have been well treated because they deserve to be, and in return they have given the company a whole-hearted service that has singled Bell workers out as models for other concerns to aim at. The executive of the company a few years ago set aside a half million dollars to establish an Employees' Benefit and Pension Plan. This



Head Office Building and "Main" Exchange, Bell Telephone Co. of Canada, Montreal.

enterprise, requiring no contribution of any kind by the employee, is working out splendidly for both company and its workers. Last year (1920) there was paid out from the fund to employees

For Pensions	\$ 8,300.11
" Accident Expense and disability	28,039.76
" Sickness Benefits	175,391.79
" Death Benefits	20,848.40

Total payments from fund 1920.....\$232,580.06

The Investment

The Bell Telephone Company of Canada has a big investment in the territory it serves—some sixty million dollars in round figures! But bigger still, in the minds of thinking, fair-minded people, is its investment in good-will and confidence as a result of its unique record of public service and its honorable career in financing and extending its system.

Mr. Fred Sage, Welland, Ont., has secured the contract for electrical work on a Clinic building being erected for Dr. W. K. Colbeck, 27 Division Street, Welland.

The citizens of Camdore, Alta., will vote in the near future on a by-law authorizing the expenditure of \$20,000 for power house improvements.

The Wheaton Electric Co., 315 Twentieth St., W., Saskatoon, Sask., have been awarded the contract for electrical work on an addition to be built to the Engineering Building, University of Saskatchewan, at an estimate cost of \$90,000.



Storage Dam on Lake Onatchiway—An important part of the Price Bros. power development.

Power Plant of Price Brothers & Co.

Company Manufactures Own Electric Power for Pulp Mills — A Modern Development with Well Regulated Water Supply

Another proof of the fact that industrial growth is correlated with power production is furnished by the firm of Price Bros. & Co., pulp and paper manufacturers. Their first considerable development is located on the Aux Sables River at Kenogami. At this point they use hydraulic power for pulp grinders, and generate about 6,000 h.p. of electrical energy for motive purposes in the mills. Not having sufficient power on this river, they later purchased the water power rights at Shipshaw Falls, or Murdock Falls, located on the Shipshaw River, some four miles from Kenogami. At this point there was a possible minimum flow of 600 cubic feet per second with a working head of about 90 feet.

Active work was started on this plant in the latter part of July, 1912, and the plant was in operation within ten months. A striking feature of this development is presented by the manner in which the water is led from the head gates at the dam into the surge tank; instead of the usual open canal, a concrete walled tunnel of 14 feet diameter and 600 feet length is used. The dam is of the stop-log type, with concrete piers and a maximum height of 35 feet. The power house is also of concrete construction and contains three 2250 kv.a. generators which deliver 60-cycle current at 6600 volts. Provision was made for syn-

chronizing this plant with the Kenogami development, where the generators are of the same voltage and characteristics. The complete electrical equipment was manufactured and installed by the Canadian Westinghouse Company, of Hamilton, and Mr. R. S. Kelsch, Montreal, was consulting engineer for the entire installation.

Power was supplied from these two plants for some time, but an increasing growth and consequent increasing power demand made it clear that at some future date a larger supply would be necessary. Provision has now been made for this in the construction of a third plant, at Chute Aux Galets on the Shipshaw, which represents the latest developments in the hydraulic and electrical engineering fields. This plant has an approximate capacity of 20,000 h.p. and will furnish additional power to the pulp and paper mills at Kenogami and Jonquiere.

The dam, which is of the gravity type, is of concrete, 1,100 feet long, 24 feet high, with an additional 6 feet flash on top. Two 13-foot penstocks of rivetted steel, 130 feet long, deliver water with a total head from flashboards to tail-race of 102 feet.

The two generators are of Canadian General Electric construction, 8,000 kv.a. capacity, and operate at 6600 volts; they are driven by Morgan-Smith turbines. Six Westing-



Price Bros. power house at Chute aux Galets—One of the most modern plants on the continent.

house transformers of 2700 kv.a. will be used to step the energy up to 44,000 volts, at which it will be transmitted to Kenogami on a steel post line.

It should be mentioned that the Murdock Falls and Chute Aux Galets power plants of Price Bros. are operated in connection with a storage dam on Lake Onatchiway. This dam was built by the company and is crib work construction with rock fill. It is 1200 feet long and 25 feet

high. The drainage area of the Shipshaw River is 1,000 square miles and a regulated flow of 1200 c.f.s. is obtained.

Work on this plant was started in September, 1919, but the difficulties of transport and the troubles caused by forest fires somewhat delayed its completion. Mr. Geo. F. Hardy is consulting engineer for this installation and the work is being carried out by Fraser Bruce & Co., Ltd., contractors.

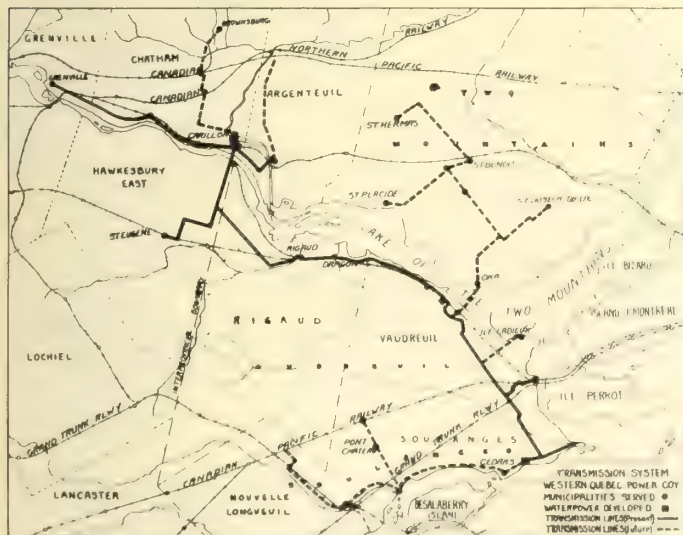
The Western Quebec Power Company

The Western Quebec Power Co., Limited, was organized early in the year 1921 for the purpose of taking over the businesses and undertakings of the North River Electric Co., Limited and the Vaudreuil Electric Co., Limited.

The North River Company owns and operates a hydro-electric plant on the North River near the village of Carillon, Que. It distributes light and power over the territory contiguous to the Ottawa River between Hawkesbury and Hudson. Its field of operation includes about nine municipalities.

The Vaudreuil Electric Company was, before its acquisition by the Western Quebec Power Co., a subsidiary of the Montreal Light, Heat and Power Consolidated, and distributed power generated at the Cedars plant of the Power Co. over the territory lying between the village of Cedars and Vaudreuil.

It will be noted that the territories of the two companies adjoin each other, and as their interests were very similar it soon became evident that the whole territory could be better served by an amalgamation than by the two companies acting independently.



Distribution Layout of Western Quebec Power Co.

The territory served by the new company will include all that part of the Province of Quebec between the Ottawa and St. Lawrence Rivers east of the Ontario Provincial line and that part of the Province of Quebec lying along the Ottawa River from Grenville to Montreal Island.

The company has at present about fifty miles of transmission line in operation and serves about twelve municipalities. It plans to extend its lines this season so as to cover the territory shown on the annexed map. The total mileage will then be about one hundred miles, and the number of municipalities about twenty-one.

As the new company has at its disposal ample resources

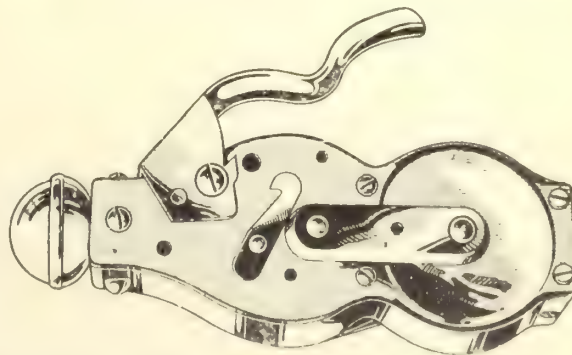
of power—secured under contract with the Cedars plant of the Montreal Light, Heat and Power Consolidated—it is in a position to place at the disposal of industries desiring to locate in the towns within its territory an adequate and reliable supply service at reasonable rates.

The development of this district has in the past been retarded by inadequate power supply, and the company is confident that under the new conditions these towns will now show a growth and development which their situation as potential industrial centres deserves.

The Board of Directors of the company consists of R. W. Barclay, president, also president of the North River Power Co.; vice-president, J. M. Robertson, consulting engineer, Montreal, and director of the Southern Canada Power Co.; directors, J. S. Norris, also vice-president and managing director of the Montreal Light, Heat and Power Consolidated; Gustave Boyer, M.P.; G. S. Balfour, of Balfour, White & Co. These gentlemen have all been connected with the operation and financing of electrical properties for many years. Under their direction the company will have the benefit of their wide experience in the business and should grow rapidly and develop into a large and prosperous organization.

Smallest Power Plant on Record

The Spielman Agencies have just announced they are placing on the market a magneto flash lamp called the "Handilite". This new appliance is shown in the illustration. The source of electrical energy is a small dynamo machine with permanent magnets. This is completely enclosed in a nickel case and operated through a train of strong gear wheels by a conveniently shaped lever pivoted to the case. When the lamp is not in use the operating



handle is held close to the case by a retaining catch. The case and operating handle are designed to suit a small hand and give it a safe and easy grip. The particular claims made for the Handilite are that it requires no refills is inexhaustible, and that it is always ready for use. The Spielman Agencies have for distribution a folder describing this appliance.

Ottawa - the Capital of the Dominion Also a busy Industrial Centre

The city of Ottawa happens to be located on the South side of the river, in the province of Ontario, but Ottawa belongs to no province, being the capital city of the Dominion. Its entire omission from this issue would therefore be unpardonable. It is one of the most beautiful cities in Canada as well as one of the most important industrially. Right within the city limits there is a large supply of hydro-electric power. The city of Ottawa can lay claim to having one of the most efficiently operated electric railway systems on the Continent, as well as one of the earliest. Distribution of light and power is partly in the hands of a private company---the Ottawa Electric Company---and partly of the municipality, which buys power under contract from the Hydro-electric Power Commission of Ontario. Altogether, Ottawa consumes about 75,000 h.p. Within 50 miles of the city it is estimated that there is available at least one million horse power, and even within 10 miles of the city hall a quarter of a million horse power is available. The advantages of this proximity in reducing the cost of transmission lines, as well as their maintenance, may be easily understood.

One of the most active industries of Ottawa is the Ottawa Car Manufacturing Company, which has a well equipped factory for supplying rolling stock of every kind required in street railway operation. Another factory operated by hydro-electric power, though not manufacturing electrical products, is the E. B. Eddy Company, with a continent-wide reputation. Another large power plant is owned by the F.R. Booth Lumber Company---Mr. Booth has long been spoken of as Canada's Lumber King. W.C. Edwards, Ltd., lumber merchants, also have an immense plant in Ottawa. The new Parliament House, of course, is recognized as one of the handsomest buildings on the Continent.

Canadian Engineering Standards Association Sub-committee on Watt-hour Meters

A meeting of this Sub-Committee was held on Thursday, August 25th, at the Engineers' Club, Toronto, Professor L.W. Gill in the chair. Considerable progress was made in preparing a revised draft of the proposed "Standard Requirements for Watthour Meters," the committee taking up first various points connected with watthour meters for alternating current; direct current meters being left for later consideration. Fifteen members were present, nominated by the meter manufacturers, the Canadian Electrical Association, the large power companies, the Hydro-electric Power Commission of Ontario, the Electrical Supply Manufacturers Association, and the Dominion Government Electrical Inspection Department.

It is expected that substantial agreement will be reached on such points as standard methods of testing for accuracy, uniform methods of marking, rating, and connection, and standard requirements for current and potential transformers and other accessories, and that it will be found possible to effect economy by limiting the number of sizes and types of watthour meter to be recognized as standard for regular production.

We regret to announce the death of Fred G. Stuart, who for the past year had been travelling Manitoba, for the Canadian General Electric Co. His death, which took place in Winnipeg on the 9th of August, appears to have been an after-effect of the flu. Previous to joining the staff of the C. G. E. Mr. Stuart spent about seven years in the employ of the Northern Electric Co. at Winnipeg. The late Mr. Stuart was 39 years of age, and leaves a wife and three children.



Where Ottawa gets her Hydro-electric Power

Engineering in McGill University

*Complete Equipment for Developing Scientific Spirit—
Theory and Practice Happily Blended*

Among the educational institutions of Canada, McGill University occupies a foremost position, representing in its traditions all that is best in our national life.

The growth of the Faculty of Applied Science of McGill has been very great in the last fifteen years, and the Department of Electrical Engineering, which was instituted in 1902, is one of its most important departments. An average of twenty to thirty students are presented for graduation by the department each year.

The growth of the electrical industries of the Dominion of Canada has been also rapid, keeping pace with the many hydro-electric and industrial developments, and the future should see an accelerated growth and a wider field as time passes.

The opportunities for young men in this field are wide, and the electrical manufacturing concerns alone have been able to utilize the services of all the men this university has been producing for some years.

The electrical department is under the charge of Dr. L. A. Herdt, as head of the department, assisted by Professor C. V. Christie, Professor E. Godfrey Burr, and Mr. G. A. Wallace as lecturer. There are also a number of laboratory assistants and mechanics.

The electrical laboratories are six in number—the junior electrical laboratory for Third Year men, the senior laboratory for Fourth Year men, the standardizing laboratory,

demonstrators, and the whole work is then carried out by the students themselves.

Each group is supplied with a motor generator, either direct connected or belted, the motor of which is operated from the d.c. service of the laboratory and provided with means for varying speed and voltage of the generator.

The high tension laboratory is fitted up for the study of high voltage phenomena up to 300,000 volts and may be supplied from any generator in the senior laboratory with full provision for distant control of frequency and voltage.

The standardizing laboratory is equipped for standardizing all kinds of electrical apparatus. Much work has been done in standardizing of electrical instruments and other electrical equipment for manufacturing and power supply companies, as very exact measurements can be carried out.



McDonald Engineering Building, McGill University.

the high tension laboratory, the oscillograph laboratory and the photometer room. One of the notable features of these laboratories is that there is no counter shafting. All the electrical equipment may be easily moved from place to place in the main laboratories by means of an electrical motor and hand operated travelling cranes.

In the system of teaching employed, work class demonstrations are but little used, but the lecture and laboratory courses are carefully co-ordinated.

In the laboratories the men are divided in groups of three or four men; the particular work on which any group is engaged is explained to them by the professors and dem-



Senior Electrical Laboratory, McGill University, showing Oscillograph in operation.

The department of electrical engineering and the department of physics of McGill have recently inaugurated a new course in Engineering Physics, which will be open to third year students in applied science and to third year students in arts who have obtained first-class standing in mathematics and physics, and will require three years of study, making a total course of five years. At the end of four years the student will graduate as a Bachelor of Science (Arts) and continue for one year as a post graduate student, proceeding to the degree of Master of Science.

This course is designed to prepare students for the particular field of Engineering Research.

Electric Service Corporation

This corporation, besides the power supplied from the larger plants of the Shawinigan Water & Power Co., obtains energy from a smaller plant on the Little Shawinigan River near the town. An available head of 90 feet is used to drive a 600 h.p. turbine, which is direct connected to a 400 kw. generator. A block of 1500 h.p. is taken from the Shawinigan Co. Distribution systems are served in Shawinigan Falls and a number of towns and villages.

The Northern Electric Company

A Manufacturing and Wholesale Distributing House that Serves Every Corner in the Dominion

By M. K. PIKE, Sales Manager

The Northern Electric Company, Limited, may be described as one of the pillars of Canadian industry and especially so in describing its relationship to the industrial development of the Province of Quebec, both generally and electrically. It is a Quebec institution in the truest sense of the word with its home in Montreal.

Like all great undertakings, it has sprung from small beginnings. The Northern Electric and Manufacturing Company, Limited, one of its immediate forbears, was incorporated on December 7th, 1895, under a Dominion Charter for the purpose of manufacturing telephones and other electrical apparatus with an authorized capital stock of \$50,000. Its other parent, The Wire and Cable Company, was granted a Province of Quebec charter on December 19th, 1899, to take over the small factory of Alexander Barrie for the manufacture of electrical wires and cables. The authorized capital stock was \$100,000. This was increased to \$5,000,000 in 1911 when under Dominion Charter, the Imperial Wire and Cable Company, Limited, was formed.

The Northern Electric Company, Limited, itself came into existence on January 5th, 1914, under Dominion Letters Patent, as a consolidation of the Northern Electric and Manufacturing Company, Limited, and the Imperial Wire and Cable Company, Limited, with an authorized capital of \$10,000,000.

With consolidation, the business was carried on in the two plants, till then operated independently by the merging companies, one at Guy and Notre Dame Streets and the other on the corner of Guy and St. James. The latter, a wire and cable plant, was, upon completion of new headquarters at Shearer and Richardson Streets, turned over to the government for the duration of the war and used as a barracks. Many thousand troops passed through it and when its military usefulness was over, the building was sold.

The building at Guy and Notre Dame Streets carried on during the war as the telephone plant of the company though much of its equipment was turned over to munitions work. The telephone plant has since been transferred to the Shearer street building which now houses the company's manufactures complete as well as the general offices and engineering department, the old Guy Street building being used by the Montreal District sales organization as heretofore and as a general merchandise warehouse.

With the increase in size of the Northern Electric organization and plant has come a corresponding spread in its scope. Originally purely a manufacturing enterprise, it has branched out as one of the largest distributors of electrical supplies in Canada and probably the largest in Quebec province both from a manufacturing and distributing viewpoint. Northern Electric has become a household term in Quebec province and in Canada largely through the predominant part it has played in establishing the rural telephone. It was the pioneer in the field and if Theodore Newton Vail made neighbors of a hundred million people, it is safe to say that many thousand Canadian farmers were included through Northern Electric foresight and perseverance. Its telephone equipment is also installed in many thousands of city homes, office buildings and the like. There is a Northern Electric telephone to every nine persons in Canada and a mile of telephone wire to every three persons. This company is

the only Canadian manufacturer of fire alarm systems and this, with its wire and cable output, and supply distributing organization, gives it rank with those great undertakings—foremost among which are the various power developments that have helped build up the province as they themselves have grown.

Northern Electric Merchandise

Manual telephones and complete equipment including switchboards, automatic telephones and equipment, wire and cables for every electrical purpose, fire alarm signalling systems and power switchboards are the company's own manufactured products. Each is the fruit of many years of manufacturing experience and it is the claim of the company that they are the best that finest materials and engineering skill can produce, and that it is the company's constant effort to keep them so.

Supply lines to be handled on a jobbing basis are selected with the view of associating only with the best make of every product. Careful consideration is given to the status of the manufacturer whom it is proposed to represent, his methods and his policy, and every product is subjected to exhaustive tests by the company's engineering department in its own laboratories. It follows, therefore, that only products of merit are accepted and marketed. They comprise line construction material, power apparatus, illumination material, lamps, wiring devices and supplies, marine watertight fittings, household appliances, storage batteries and power and light plants. Train dispatching and telegraph equipment are handled as a specialized department.

Distribution is effected through a chain of branch ware-



Montreal Local Sales Office and Merchandise Warehouse

houses and sales offices stretched across the Dominion, including the cities of Halifax, Quebec, Montreal, Toronto, Hamilton, London, Windsor, Winnipeg, Regina, Calgary, Edmonton, and Vancouver, which with the Shearer Street offices and factory, give employment to 3,200 people, 2,800 of whom reside in Quebec province.

Northern Electric Employees

Careful arrangement is made for the employees' well-being and comfort. A Pension and Sick Benefit Fund was inaugurated by the company early in 1920, the operation of

which is described in these pages by A. J. Gracie, while the Red Cross Department dealt with by Dr. Haldimand is a model of what may well exist in every large plant.

The Northern Electric Engineering Society has an exclusive Northern Electric membership, and under its president, W. S. Vipond, wire and cable engineer, has accomplished valuable educational work among younger members of the engineering and technical staffs.

A staff restaurant where meals are served at cost is maintained by the company, together with a rest room in charge of a matron for the female office employees.

Recreation is fostered, it being recognized that the spirit



Manufacturing Rubber for Insulating Purposes

of good fellowship and co-operation exists to the greatest extent between those who know each other at play as well as at work. The Northern Electric Athletic Association functions to this end and bowling, hockey, baseball and dancing flourish in season, with an occasional minstrel show and an annual picnic.

All these evidences of thoughtful administration bear fruit in the healthy family spirit that exists throughout the staff, spelling loyalty to the company and its ideals.

The Home of Northern Electric

The home of the Northern Electric Company, Limited, as seen from an aeroplane, is pictured on the outside front cover of this issue. It is one of Canada's largest plants and one that strikingly exemplifies the industrial development of Quebec Province. The description that follows is of interest also in that it shows that almost without exception nothing but Canadian-made materials and Canadian workmanship went into the structure.

Bounded by St. Patrick, Shearer and Richardson Streets, the Northern Electric plant occupies an area of 178,000 square feet, over four acres.

The E. G. M. Cape & Company, Limited, had the general contract for the building. The foundations for walls and columns are composed of plain and reinforced concrete. In the main building and some of the one-storey portions the columns rest on Raymond concrete piles, of which over 4,000 have been driven with an average length of 12 ft. On each group of piles rests a reinforced concrete cap on which bases for the building columns are placed.

The 6,500 tons of structural steel required for the superstructure were supplied and erected by the Dominion Bridge Co., Bethlehem H columns, girders and beams were used almost exclusively throughout.

The most modern fireproof construction has been used throughout the entire building, all interior columns being incased in $4\frac{3}{8}$ inches of hollow terra cotta, and beams

in $2\frac{3}{8}$ inches. The floors are composed of hollow terra cotta segmental arches with a span of 6 ft. 8 in. and are suitable for a live load of 288 lbs. on the second to seventh floors and 150 lbs. on the eighth floor. A stone concrete fill is poured over the arches, in which wooden sleepers are embedded, and the underflooring is nailed to these sleepers, and over this the final maple flooring is laid at right angles. The National Fireproofing Company supplied all the fireproofing terra cotta, amounting to 11,000 tons.

The walls are built of Laprairie Plastic Brick, seven millions being used. All the lintels in the courts and on the street sides, together with the architectural ornaments and copings on the street sides, were supplied by the Atlantic Terra Cotta Co., of Tottenville.

The main buildings shaped like the letter "E," have two main courts which serve to provide ample lighting facilities for the 500,000 sq. ft. of floor space from the interior as well as the exposed sides on the streets. These courts have sloping roofs of book tile with large skylights. The G.T.R. and C.P.R. railway tracks run into one court which has large platforms for shipping and receiving purposes. Each track is provided with a 150-ton Canadian Fairbanks track scale.

There are four travelling electric cranes, 1 50-ton, 1 20-ton, 1 20-ton with 5-ton auxiliary hoist, and 1 10-ton, all made by the Case Crane Co. The 50-ton crane is used for handling reels of armoured cable, the 20-ton for the lead covering dept., the 20-ton with 5-ton auxiliary for the turbine room, and the 10-ton for impregnating tank room. The two 20-ton cranes are so arranged that they can pass material to the 50-ton, which will convey it over the railway tracks, or vice versa.

Fire walls with automatic steel fire doors on both sides, divide the building into various sections. Each section has a fire and smoke proof stair tower with iron stairs at both ends, thus providing ample and safe means of exit in case of fire on any floor.

The fire doors for the whole building were supplied by the Architectural Bronze and Iron Works and the iron stairs by John Watson & Son, Limited. All windows throughout the building have steel frames with wire glass. Pivoted sec-



Brading Machines in Operation

tions of these windows can be opened with operating chains equipped with fusible links, thus making them self-closing in case of fire. The 95,000 sq. ft. of steel sash required for the factory was supplied by the Trussed Concrete Steel Company, and the casement sash for the offices by Henry Hope & Son, Ltd.

All drains and underground sprinkler mains were installed by James Ballantyne. The sprinkler and fire hose

systems above the first floor level were supplied by H. G. Vogel Company (Canada) Limited, and consist of 6,000 sprinkler heads and fire hose located at convenient points in the building. These systems are supplied with water from the city mains, steamer connections on the street and a 1,500 gallon Worthington Underwriter's fire pump which is connected to a 100,000 gallon concrete reservoir and the canal.

Five 6,000 and one 15,000 lb. freight elevators with a travel of 100 ft. and 25 ft. per minute respectively, are used to handle the transfer of material for manufacturing, and two high-speed passenger elevators travelling at 350 ft. per minute, are used to serve the general offices of the company, which are situated on the eighth floor of the building. They were supplied by the Otis-Fenson Elevator Co. This eighth floor has no columns, the roof being supported by steel trusses with large sky-lights. The absence of columns afford splendid facilities for the laying out of offices to suit the requirements.

A unique point in the design of the building is the storage space secured on the roof of one section by means of paving bricks. The roof is served by means of one of the 6,000 lb. freight elevators.

Large intake pipes from the canal supply the reservoir and the water used for condensing purposes. An automobile garage and a waggon court with platforms facing St. Patrick Street are so arranged that the material can be readily loaded for city delivery without having to cross the railroad tracks.

The building is heated by a forced circulation hot water heating system. Exhaust steam from one of the main turbines pass through closed heaters. The water is circulated by means of a 4,000 gallon Alberger single stage volute pump



Insulating Telephone Conductors with Paper

directly connected to an Alberger Curtis steam turbine. The vapors and condensate from the exhaust steam is carried from the heaters by means of an Edwards Air pump with tail pump. This makes a very flexible system to suit the changes in the outside temperature, as the vacuum can be increased in warm weather, thereby creating a lower temperature of the exhaust steam and decreasing the amount of steam required by the turbine as the vacuum increases.

In extreme cold weather the turbine can exhaust into the heater at atmospheric pressure and thus increase the quantity and temperature of the steam. When running two turbo-generator units in parallel, one turbine can run condensing, while the other exhausts into the heating system and its load can be varied to suit the amount of steam required for heating purposes. The power plant equipment for this heating system is in duplicate, either one of the units being large enough to take care of the whole system. The enclosed heat-

ers mentioned above were built by John McDougall Caledonian Iron Works, Limited.

The Canadian Ingersoll Rand supplied two steam-driven air compressors which have a combined capacity of 1200 cu. ft. per minute.

The power plant is of the most modern design, coal can be stored in large quantities and will be transferred to



Stranding a 400 Pair Telephone Cable

the storage bins over the front of the boilers by means of a Telfer car and clam shell bucket. Ash handling equipment takes the ashes direct from the ash chutes under the boilers and delivers them into ash storage bins which, in turn, deliver them into railroad cars or carts for disposal. Ashes can also be handled by means of small cars on an industrial railway running in the basement of the boiler room. The Telfer car will raise the body of each of these cars off the truck through a hatchway in the main boiler room floor and will carry them over to the ash storage bin. This method of ash handling only being used when it is necessary to overhaul and repair the regular ash handling equipment.

A 225 foot chimney, built by the Alphons Custodis

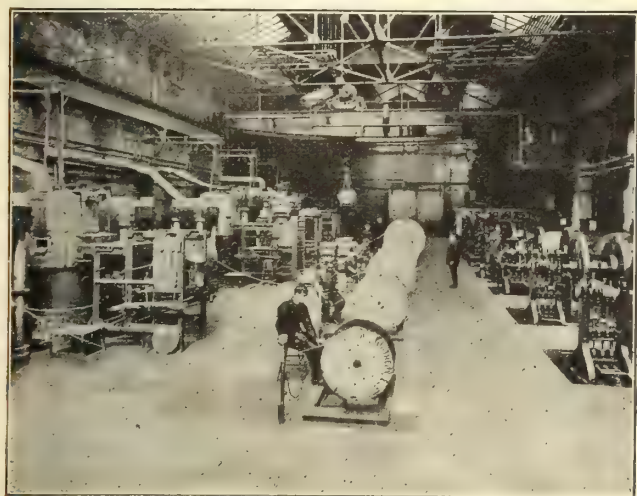


Impregnating Tanks—Paper Power Cable

Chimney Construction Company, serves four B. & W. boilers nominally rated at 650 horse power, but which can be forced to deliver 1,000 horse power when necessary. These boilers are fitted with B. & W. chain grate stokers and superheaters. The exhaust steam and condensate from the heaters, turbines, condensers and steam driven auxiliaries is brought to a Warren and Webster feed water heater, which is capable of raising 107,000 lbs of water per hour to

2100. From this heater the water is returned to the boilers by means of two Weir boiler feed pumps, each with a capacity of 6,000 Imperial gallons per hour.

General Electric Curtis horizontal turbines form the motive power for the generators and are placed on structural steel stands directly over the Alberger centrifair con-



Lead Covering Paper Power Cable

densers, thus ensuring a high vacuum. The condensers are located over 2-42" pipes leading to the canal. From one of these pipes the water is drawn by a turbo-volute turbine driven pump, and after having passed through the condenser, is discharged into the other pipe. Tunnels leading from the turbine and pump room are used to run the power and lighting circuits, the flow and return pipes of the forced hot water heating system, the house service water lines and the high pressure steam lines for manufacturing purposes.

The turbine room has been laid out for 2-2,000 kw., 2-1,000 kw. turbo-generators, 2-450 kw. rotary converters and 2-75 kw. turbo-driven exciters. The generators are three phase, 60 cycles, 440 volt star wound with neutral connection brought out to the switchboard. The exciters are 125 volts and generator voltage is controlled by a Tirrill regulator.

Air for the ventilation of the generators is taken from a duct in the foundations of the generators and forced through



High Tension Testing Department

the windings and air passages by fans integral with rotors. Screens are provided in the pent house of this duct to exclude dust, etc.

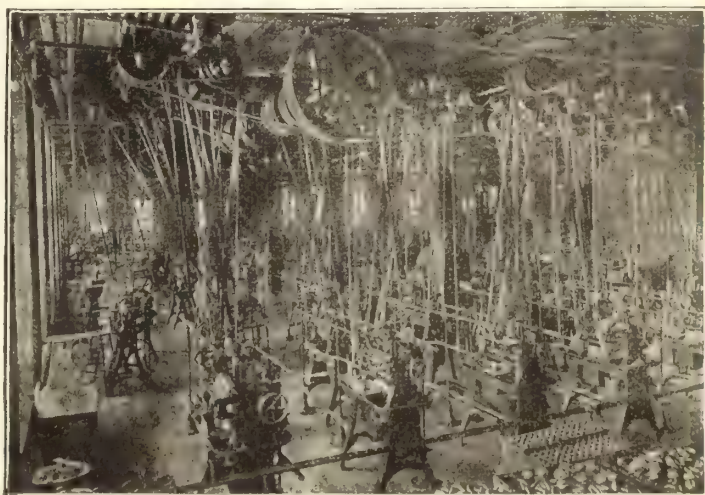
The horse power of connected load is approximately 550

h.p. direct current at 115 volts and 4,000 h.p. alternating current at 440 volts. For the supply of the former, two 460 kv. a. Rotary Converters with necessary transformers and starting switches, are installed, the neutral being brought out from each transformer bank for the neutral of a 115/230 volt 3 wire direct current system.

The switchboard for the control and distribution of this power consists of a main board of twenty-five Blue Vermont Marble panels on the turbine room floor. On this board is mounted the meters for measurements of outputs of generators and loads on the feeders, also the direct current bus-bars both for exciters and direct current factory load, and control equipment for twenty-five solenoid operated feeder switches for alternating current distribution.

These switches will be mounted on Monson slate panels on a mezzanine floor under the turbine room floor. The alternating current 440 volt bus-bars and generator switches are also located here.

Generator switches are non-automatic with bell ringing attachment and feeder switches automatic, as mentioned above. All feeders leave the turbine room in a tunnel from which they branch off to the various buildings in three inch fibre conduits. These fibre conduits lead to cable pits from which risers of three inch conduit are carried to distributing panels. All alternating current cables are three conductor paper insulated, leaded; direct current cables being single conductor, leaded. For lighting factory area, four light clusters, wired series parallel, are used. As mentioned above, the neutral point of generator windings are brought out. The lead sheath of the lighting feeder cables are bonded to the neutral bus, and lighting circuits connect one wire to one of the three conductors, the other to the sheath, giving approximately 266 volts across two lamps in series. Lighting feeder cables lead to distributing boxes on the third floor of each



Automatic Screw Machine Department

section from which circuits run to the panel boxes on the different floors. Power feeders run to distributing boxes on the third and fifth floors.

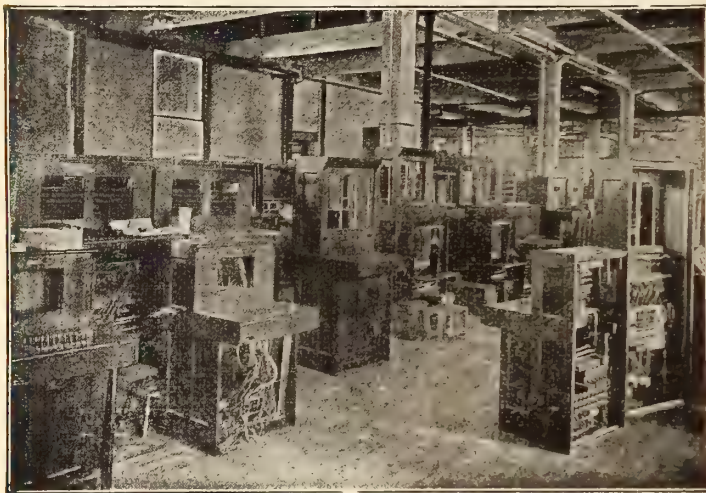
All wiring, except that in the general offices is open conduit. The general offices have outlets for fans, dictographs, annunciators and telephones, all wiring concealed in conduit.

An artesian well was drilled by Wallace Bell Company, Limited, and is used for drinking water and for manufacturing purposes.

In addition to the fire protection system, a regular watchman's service is installed, so that the building is patrolled at all times outside of the regular working hours. For the convenience of watchmen, and to avoid the use of oil lanterns

in the plant, a certain number of electric lights are kept burning all night to form a pilot system, so that in cases of emergency the workmen in the building can easily locate the fire apparatus and also the exits.

The following features in connection with the building are of interest:—



Switchboard Assembly Department

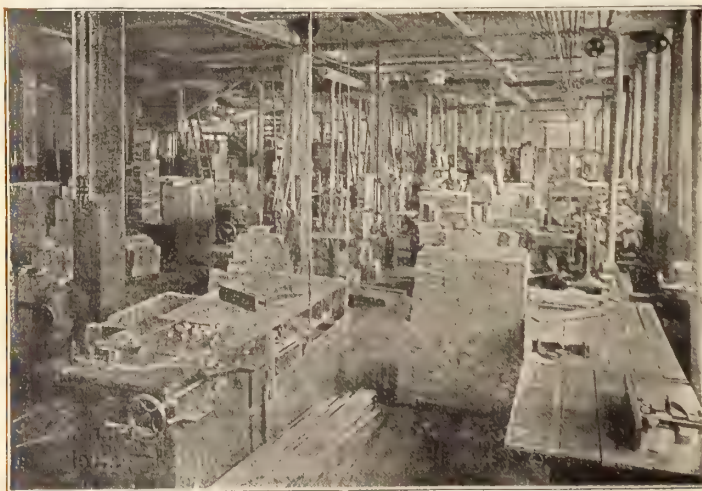
The total excavation amounted to some 50,000 cu. yds. Over 14,000 cu. yds. of concrete have been used for foundations. 100,000 sq. ft. of glazing glass have been used, and approximately 100,000 sq. ft. hot water radiation surface were required.

Ground area for manufacturing purposes	10-1/2 acres
Floor space " " "	630,000 sq. ft.
" " " merchandising throughout the company	375,000 sq. ft.
Electricity used in 1920	3,450,000 kw. hours.

The Northern Electric Pension Fund

By A. J. Gracie.

The Northern Electric Company, Limited, always interested where the welfare of their employees is concerned, has established an Employees' Pension and Benefit Plan, grant-pensions, and sickness and death benefits to employees with continuous service of two years or over. The provisions of the Plan do not call for any contribution by the employees, the whole cost being borne by the company. The purpose in view is not only to recognize the loyalty and devotion of the



One of the Woodworking Departments

employees, but to offer greater protection to them when overtaken by illness, accident or infirmity.

The Plan provides for pensions to employees under three classifications:

(1) A male employee whose age is sixty years or more (female fifty-five or more) and whose term or employment has been twenty years or more.

(2) A male employee whose age is fifty-five but less than sixty years (female fifty, but less than fifty-five) and whose term of employment has been twenty-five years or more.

(3) A male employee whose age is less than fifty-five (female less than fifty) and whose term of employment has been thirty years or more.

An employee whose term of employment has been fifteen years or more and who becomes totally disabled by reason of sickness or of injury, other than by accidental injury arising out of and in the course of employment by the company, may, at the discretion of the committee, and with the approval of the president or vice-president, be granted a disability pension, which shall continue for such period only as the committee may decide.

Total Disability Benefits.—Full pay for first thirteen weeks, half pay for remainder of disability. Maximum benefits not to exceed twenty dollars (\$20.00) a week after six years of such payments.

Partial Disability Benefits.—100% of loss of earning cap-



Gas Furnaces for Hardening Ring Magnets

acity for first thirteen weeks: 50% of loss in earning capacity for the remainder of the disability. Total period of payments not to exceed six years.

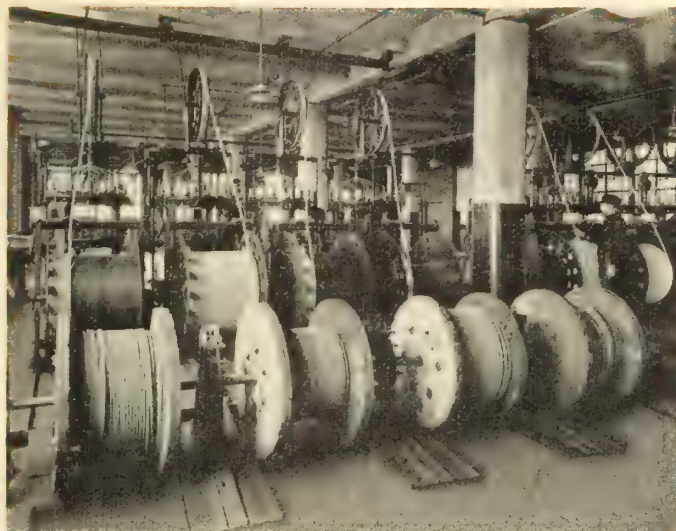
Accident Death Benefits resulting from injuries arising out of and in the course of employment of the company are computed on the basis of an amount equal to three years pay, but in no case shall the death benefit exceed \$5,000. In addition to the death benefit, the necessary expenses of the burial of the deceased employee, not exceeding one hundred and fifty dollars.

Sickness Benefits, the sickness to include injury other than accidental injury arising out of and in the course of employment by the company, are figured on a graduated scale based on length of service.

Sickness Death Benefits, based on the employee's length of service, are paid to verified beneficiaries.

For Employees, with service of five years but less than ten years, six months pay; those with service of over ten years one year's pay, amount not to exceed \$2,000 in either case.

Proper provision was made for employees who left the



Large Braiders, used principally in Braiding Cotton Insulation on Waterproof Cable.

company for military service and returned by January 1st, 1920. It was considered that they were in the continuous employ of the company while absent and their service records read accordingly.

This plan is an excellent example of what can be done to develop a spirit of confidence between employer and employee; that such work is appreciated by the employees is shown by the expressions of gratitude received from those who have received benefits from the Fund, and, by the hearty co-operation between employees and the committee, which enables the operation of the Fund to proceed smoothly.

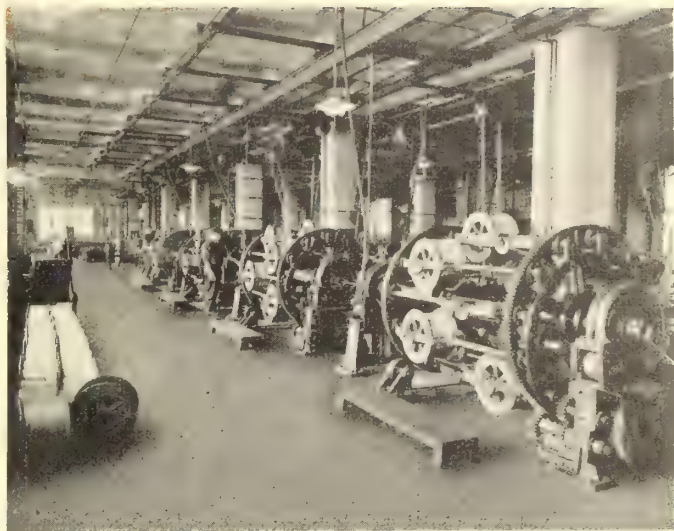
The Northern Electric Red Cross Department

By Dr. A. W. Haldimand.

On the 15th day of February, 1918, the Northern Electric Company placed me in charge of the Red Cross Department of their plant, and by so doing practically inaugurated a new branch of surgery in the City of Montreal. It is the duty of this department to treat all accidents or injuries to the employees and to render first aid to all who take sick during working hours. In addition, this department gives a thorough physical examination to all applicants who are to be engaged by the company, in order to minimize the risk of accident, or loss of time through sickness, and, in connection with the Em-



Red Cross Department, with Doctors and Nurses in Attendance.



Large Bare Wire Strander.

ployees' Benefit Fund, the nurses visit the sick in their houses and see that they receive proper care and medical treatment by their own physicians.

The equipment of the Red Cross Section in the Shearer Street plant is second to none in Canada. Here are installed a complete sterilizing plant by which means all surgical dressing prepared on the premises may be properly rendered aseptic, as well as all vessels and instruments used in treating surgical cases; an operating table, a special chair for the treatment of eye cases, involving removal of foreign bodies from the eyes; lung motor for resuscitating cases of electric shock; and various other apparatus.

Throughout the buildings, in each department where machinery is operated, Red Cross boxes are placed, which may be used after regular working hours when the Red Cross Department is closed.

I am satisfied that all large plants in Montreal and other manufacturing centres will have a similar equipment in the near future.



General Department Officials of the Northern Electric Company:—Front row—C. Say, secretary-treasurer; J. D. Hathaway, vice-president and general superintendent; P. F. Sise, president; M. K. Pike, general sales manager; W. C. Adams, chief engineer. Second row—C. E. R. Jones, tel. and cable sales manager; W. Carswell, chief accountant; J. S. Cameron, assistant general superintendent; G. R. Allerton, advertising manager. Third row—F. M. Davis, general merchandise manager; L. A. Johnson, supply sales manager; D. M. d'Almeida, general purchasing agent.

To the Contractors and Dealers of the Province of Quebec

The Ultimate Success of the Electrical Industry rests with You. Your Harvest is Ripe—Are you Gathering it Home?

Many times during the last few months we have been asked the question—"What are the prospects in Quebec Province in the household appliance field?"

Before presuming to hazard an answer to this question let us consider it from two angles.

- (1) To what extent, on the average, has the harvest been gathered, and
- (2) What are the general possibilities as indicated by individual effort and experience?

To what extent, on the average, has the appliance harvest been gathered in the Province of Quebec?

Some weeks ago The Electrical News took an inventory of the Canadian situation as regards electrical household appliances. The average degree of saturation for all Canada was low—far too low—but the Province of Quebec, in nearly every case, was below the average. Let us take, for example, the two most saleable items at the present stage of our development—electric washing machines and electric vacuum cleaners. The degree of saturation of washing machines for all Canada was 5.9%, but for Quebec it was only 4%. The average Canadian figure for vacuum cleaners was 5%, while Quebec showed 3.5%.

Just think of the sales opportunities—only 4% and 3½%, respectively, of the electric wired houses in Quebec Province provided with washing machines and vacuum cleaners.

In actual numbers, what does this mean? Let's figure!

Suppose there are 2,500,000 people. The province is noted for its large families, so perhaps we may put the average at six persons. This gives us, roughly, 400,000 homes. Half of these, let us say, are rural and, to a considerable extent, beyond the reach of the electrical appliance salesman for the time

being. This leaves 200,000 homes with electrical energy supply. But our inventory showed further that only 75 per cent. of such Quebec homes were wired. This gives us a final figure of 150,000 wired homes, only 4% and 3½% of which know the blessings of the electric washing machine and the electric vacuum cleaner.

That's a "man's job" for the contractor-dealer of Quebec—supplying 150,000 homes (i.e., 900,000 people) with electrical appliances of every sort.

What are the general possibilities as indicated by individual effort and experience?

There is no country in the world where the people are more home-loving, where the "pater familias" takes greater delight in his home, or where the home conditions of large families make the necessity and desirability of electric labor and time-saving devices more evident. Conditions in Quebec are, evidently, very favorable to large appliance sales. This is borne out by experience and figures. One company reports sales, **per capita, per month**, in electrical merchandise of \$3.14. This in some of their smaller towns, too, where the people, in general, are often termed "slow." The same company has set \$40.00 per capita per year as a sales figure to be attained, and anticipate reaching their goal in the near future. If they have already reached the \$3.14 mark per month, which means \$37.68 per year, it is not going to take them very long to get beyond \$40.

And there are 900,000 people waiting to spend their money. \$40 x 900,000 equals \$36,000,000.

A tidy sum for the electrical dealers of the Province of Quebec for one year's effort.

Let's start!

All that's needed is Confidence and Merchandising Ability.

—The Editor.

Aux Entrepreneurs et Marchands de la Province de Québec

Le succès de l'Industrie Electrique repose sur vous.
Votre récolte est rendue à maturité. La mettez-vous en grange ?

Bien des fois, pendant ces derniers mois, il nous a été posé la question: "Quelles sont les prévisions dans la Province de Québec dans le domaine des accessoires électriques pour la maison?"

Avant de donner une réponse au hasard, considérons la question à deux points de vue:—

- (1) Jusqu'à quel point, en général la récolte a-t-elle été faite, et
- (2) Quelles sont les possibilités générale, telles qu'indiquées par l'effort et l'expérience individuels?

Jusqu'à quel point, en général, les commandes d'accessoires électriques ont-elles été recueillies dans la Province de Québec?

Il y a quelques semaines, l'"Electrical News" faisait un inventaire de la situation canadienne relativement aux accessoires électriques de ménage. La moyenne des commandes pour tout le Canada était faible, beaucoup trop faible, mais la Province de Québec, presque partout, était au-dessous de la moyenne. Prenons par exemple les deux articles qui se vendent le plus à la phase de développement où nous nous trouvons — les machines à laver électriques et les nettoyeurs électriques vacuum. Le pourcentage des gens possesseurs de machines à laver électriques pour tout le Canada était de 5.9%, mais il n'était que de 4% pour la province de Québec. Le pourcentage moyen au Canada pour les possesseurs de nettoyeurs vacuum était de 5%, tandis que pour la province de Québec, il ne se chiffrait qu'à 3.5%.

Songez un peu aux possibilités de ventes — 4% et 3½% seulement respectivement des maisons bénéficiant de l'électricité dans la province de Québec sont pourvues de machine à laver électrique et de nettoyeur vacuum.

En chiffres exacts, quelle est la signification de ce faible pourcentage?

Calculons!

Supposons qu'il y ait 2,500,000 personnes. La province de Québec est réputée pour ses familles nombreuses, de sorte que nous pouvons les mettre en moyenne à six personnes. Cela nous donne approximativement 400,000 foyers. La moitié de ceux-ci sont dans des districts ruraux et jusqu'à un certain point hors du champ d'action du vendeur d'accessoires électri-

ques, tout au moins pour le présent. Ceci nous laisse 200,000 foyers ayant l'énergie électrique. Cependant notre inventaire nous informait que 75 pour 100 seulement de ces intérieurs de la province de Québec étaient reliés à l'électricité. Ceci nous donne donc un chiffre final de 150,000 maisons munies du pouvoir électrique dont 4% et 3½% seulement connaissent les bienfaits de la machine à laver électrique et du nettoyeur électrique vacuum.

C'est un rude ouvrage pour le marchand-contracteur de la province de Québec que de fournir à 150,000 maisons (c'est-à-dire 900,000 personnes) les appareils électriques de toutes sortes.

Quelles sont les possibilités générales telles qu'indiquées par l'effort et l'expérience individuels?

Il n'y a pas de pays au monde où les gens soient plus attachés à leur chez-eux, où le père de famille prenne plus de plaisir à son foyer, où les conditions des grandes familles rendent plus nécessaires et plus désirables les installations qui épargnent du temps et qui font l'ouvrage par pouvoir électrique. Les conditions dans la province de Québec sont, évidemment très favorables à de fortes ventes d'appareils électriques. C'est ce qui ressort de l'expérience et des chiffres. Une compagnie fait rapport que ses ventes **par tête et par mois**, en marchandises électriques ont été de \$3.14. Et ceci dans une des plus petites villes où les gens, en général, sont considérés comme "durs à la détente." Cette même compagnie a fixé à \$40.00 par tête et par an le chiffre de vente qu'elle se propose d'atteindre et elle s'attend à y réussir dans un avenir prochain. Si elle a déjà atteint le chiffre de \$3.14 par mois, ce qui représente \$37.68 par an, cela ne saurait prendre beaucoup de temps avant qu'elle ne dépasse les \$40.00.

Et il y a 900,000 personnes attendant de dépenser leur argent; \$40 x 900,000 égal \$36,000,000.

Une jolie somme pour les marchands d'appareils électriques de la province de Québec, pour l'effort d'une année.

Mettez-vous-y!

Tout ce qu'il faut, c'est de la confiance et de l'habileté de vente.

L'Editeur.

Scientific Merchandising is Basis of Progress in Electrical Industry

The Province of Quebec, Electrically, is Organized for Effective Co-operation. The Electrical Co-operative Association is all embracing -- Central Stations, Engineers, Wholesalers, Manufacturers, Contractors, Dealers. Much Excellent Educational and Constructive Work has already been Accomplished

By J. N. MOCHON, Secretary-Manager

Previous to the formation of the Electrical Co-operative Association, Province of Quebec, conditions existed here similar to those in other parts of the country where Associations had been formed to promote and protect the interests of certain branches of the electrical industry. It was felt, however, that much better and more far-reaching results could be obtained with a proper organization built along co-operative lines. With this object in view, a campaign was started to arouse the interest of the electrical fraternity in the province, and a number of enthusiastic meetings were held which finally resulted in the formation and subsequent incorporation, under the laws of this province, of the Electrical Co-Operative Association, Province of Quebec; a provisional committee was appointed to study the purposes and plans of the proposed association, outlining the duties of the various committees to which might be entrusted its direction and the selection of employees which it might be decided to have. This organization committee was later made permanent with the following officers:

Hon President:—J. S. Norris, vice-president and general manager Montreal Light, Heat and Power Consolidated.

President:—K. B. Thornton, general manager Montreal Public Service Corporation.

Vice-Presidents:—J. B. Woodyatt, general manager, Southern Canada Power Co. Ltd.; J. W. Pilcher, district manager Canadian General Electric Co. Ltd.; M. K. Pike, general sales manager Northern Electric Co. Ltd.; F. J. Parsons, managing director McDonald & Willson Co. Ltd.; N. Simoneau, electrical contractor, Simoneau Electric Contracting; Dr. L. A. Herdt, McDonald Prof. of Elec. Engineering, McGill University; R. J. Beaumont, gen. manager subsidiary distribution cos., Shawinigan Water and Power Company.

Hon. Secretary-Treasurer:—L. C. Haskell, secretary-treasurer Southern Canada Power Co. Ltd.

Manager-Secretary:—J. N. Mochon.

Advisory Council, Central Station Representatives:—W. O'Brien, mgr. New Business Department, Montreal Light, Heat & Power Consolidated; L. C. Haskell, secretary-treasurer Southern Canada Power Co. Ltd.; N. L. Engel, New Business Department, Montreal Public Service Corporation; W. J. Lynch, general manager Quebec Railway Light & Power Co. Ltd.

Manufacturers' Representatives:—C. Duncan, managing director Duncan Electrical Co. Ltd.; Geo. Wight, managing director and secretary-treasurer Monarch Electric Co. Ltd.; C. F. Medbury, district manager Canadian Westinghouse Co. Ltd.

Jobbers' Representatives:—J. W. Pilcher, district manager Canadian General Electric Co. Ltd.; M. K. Pike, general sale manager Northern Electric Co. Ltd.; S. W. Smith, president Electrical Equipment Co. Ltd.

Contractor-Dealers' Representatives:—J. A. St. Amour,

electrical contractor, Montreal; F. J. Parsons, managing director McDonald & Willson Co. Ltd., Montreal; W. B. Shaw, manager Montreal Electric Co. Ltd.; J. M. Walkley, Henry Morgan & Co. Ltd.; Wm. Rochon, contractor, 454 Park La-fontaine; R. H. Doddridge, manager Quebec Electric Co., Quebec, P.Q.; J. Nault, Nault & Brown, Three Rivers, P.Q.; W. Wiggett, Wiggett Electric Co. Ltd., Sherbrooke, P.Q.

Consulting Engineers:—De Gaspé Beaubien, Montreal; J. M. Robertson, J. M. Robertson & Co. Ltd.

Public Utility Company Representatives:—H. R. Mallison, assistant to president and purchasing agent Montreal Tramways Co.; J. A. Shaw, electrical engineer, Canadian Pacific Railway; W. H. Winter, general superintendent of plant Bell Telephone Co. of Canada.

In order to expedite the Association's affairs, a strong executive committee was elected by the Advisory Council, with Mr. M. K. Pike as chairman and Mr. W. J. O'Brien as vice-chairman.

The executive appointed Mr. J. N. Mochon as manager-secretary.

In order to establish properly the foundations of a permanent organization, the executive took in hand the question of its constitution and by-laws setting forth its objects, formation and duties of the various committees, officers and employees, etc.; these were laid out in as brief and concise a manner as possible considering the importance of its aims, as a persual of the following will show:

CONSTITUTION

Name

The name of this association shall be the Electrical Co-Operative Association, Province of Quebec.

Objects

The objects of the association shall be:

1. By education, instruction and co-operation amongst members of the electrical industry to develop and improve the service rendered to the public by that industry.

2. To develop a closer co-operation and understanding between central stations, contractor-dealers, manufacturers, jobbers, engineers, architects, telephone and telegraph and railway companies and other persons or bodies interested in the electrical industry to the end that the efficiency of the various branches of the industry serving the public may be increased.

3. To conduct a suitable educational campaign with a view to encouraging the public towards a more extensive use of electricity.

4. To educate the public as to the importance of the service rendered by electricity in the development of public industry and welfare.

With a view of attaining the said objects:

5. To encourage the practice of good business methods

6. To endeavor to bring about improvement of methods

in all branches of the electrical industry, including accounting, sales, advertising and general store appearance.

7. To give and conduct demonstrations, exhibitions, and displays and to acquire, hold, maintain, operate, lease and dispose of such buildings and immovable and moveable property for such purpose, or for such other purposes as may be connected with the objects of the association.

8. To assist each or any branch of the industry when occasion requires.

9. To endeavor to obtain fair treatment for invested capital and to bring about a fair attitude on the part of the public towards electrical development.

Members

Any person, firm, company, association or institution engaged in the business of producing, dealing in electricity, electrical appliances, or supplies or equipment used in any such business, or engaged in any vocation or carrying on any operations in any way connected with the use or study of electricity shall be eligible for membership in the association.

Candidates for membership shall be proposed by one member and seconded by another.

All applications for membership shall be addressed in writing to the association, and such application shall be dealt with by the Advisory Council. The Advisory Council shall have the power to grant or reject any such application at its discretion.

The Advisory Council may by resolution call upon any member, who, in the opinion of the Advisory Council, is not co-operating in a satisfactory manner towards the attainment of the objects of the Association, to resign. A vote of two-thirds of the members of the Advisory Council shall be required in order to adopt a resolution calling upon any member to resign. Upon the notification of such resolution to the member therein referred to, that member shall thereupon ipso facto cease to be a member of the Association.

Any member intending to resign from membership of the Association shall signify his wish in writing to the secretary at least thirty days before the date when such resignation is to take effect.

Annual Meeting

The annual meeting of the Association shall be held on a day in the months of October or November of each year to be fixed by the Advisory Council. Special meetings of the Association may be held at the call of the Advisory Council.

Advisory Council

The Association shall at its annual meeting elect an Advisory Council which shall hold office until the next annual meeting, and which shall direct the affairs of the Association. For purposes of presentation on the Advisory Council, the membership shall by by-law be divided into various sections, each section to be representative of one branch of the industry. The minimum number of members of the Advisory Council which members of each section shall be entitled to elect shall be specified in the by-laws of the Association.

Vacancies in the Advisory Council may be filled and additions thereto made by resolution of the Advisory Council.

Meetings of the Advisory Council shall be held at the call of the President, or, in his absence, of a Vice-President, or by the Honorary Secretary-treasurer upon request in writing of six members.

A quorum of the Advisory Council shall consist of eight members representing at least four sections of the industry, as such sections are defined in the by-laws of the Association.

Executive Committee

The affairs of the Association shall be managed by an Executive Committee, which shall act under the direction of

the Advisory Council. The Executive Committee may exercise such discretion as to the manner in which the instructions of the Advisory Council shall be carried out, as shall not be inconsistent with such instructions.

The Executive Committee shall consist of the President, the Vice-president, and the Honorary Secretary-treasurer of the Association, and five members who shall be elected by the Advisory Council at its annual meeting. Any member of the Executive Committee may be required by resolution of a meeting of the Advisory Council to resign and a member of the Association may be elected by similar resolution to fill any vacancy occurring in the executive committee from this or any other cause.

Meetings of the executive committee shall be presided over by a chairman, or in his absence, by a vice-chairman, who shall be annually elected by that committee.

Regular meetings of the executive committee shall be held at least once each month at such time and place as the committee shall by resolution determine. Special meetings may be held at the call of the chairman, or in his absence, of the vice-chairman.

Four members shall constitute a quorum for any meeting of the executive committee.

Notices of Meetings

Notices of all meetings of the Association, of the Advisory Council, or of the Executive Committee, shall be mailed to the members entitled to be present thereat, or their representatives, at least forty-eight hours before the hour set for such meetings.

Officers

The officers shall consist of a president, three or more vice-presidents, chairman and vice-chairman of the executive committee, and an honorary-secretary-treasurer, who shall be members of the advisory council and executive committee.

The officers of the association, with the exception of the chairman and vice-chairman of the executive committee, shall be elected at the annual meeting of the advisory council, which shall be held immediately after the adjournment of the annual meeting of members, and shall hold office until the next annual meeting of the advisory council.

Duties of Officers

The president shall preside at all meetings of the association and of the advisory council. In his absence, a vice-president shall preside.

The chairman or vice-chairman of the executive committee shall preside at all meetings of the executive committee, and in their absence, the committee shall appoint its own chairman.

The honorary secretary-treasurer shall keep a record of the proceedings of the general meetings of members of the association, and shall submit a record of same to the annual meeting of the association. He shall receive all monies, and make all disbursements under the direction of the executive committee. He shall keep an accurate record of all receipts and disbursements and submit a statement of same, duly audited, for the adoption of the annual meeting of the association.

Manager-Secretary and Employees

The executive committee may appoint for a period not to exceed one year a manager-secretary, who shall receive such remuneration as the said committee may determine. The manager-secretary shall perform such duties as may be allotted to him by the executive committee, and shall do such work in connection with the keeping of records of minutes of meetings, and such accounts of receipts and disbursements

of the association as he may be called upon to keep by the honorary secretary-treasurer.

The executive committee may also appoint for a similar period and at such salary as it shall deem proper such field representatives, or other employees of the association, as the said committee may deem necessary or desirable.

The method of raising funds necessary to finance the expenses of the association shall be determined by the advisory council.

Auditor

At each annual meeting of the members of the association, an auditor shall be appointed for the ensuing year. The auditor shall audit the books of the association, and shall sign the balance sheet to be submitted at the next annual meeting of the association.

Amendments to the Constitution

Any articles of the constitution of the association may be repealed or amended and any new articles of the constitution may be enacted by a vote of two-thirds of the members present at any annual or special meeting of the association, provided that notice in writing shall have been given to all the members of the association of the proposed alteration of the Constitution at least ten days prior to the meeting at which such alterations are to be voted upon.

BY-LAWS

Headquarters

The association shall have its headquarters in the Drummond Building, 511 St. Catherine Street West, Montreal, or at such other place as may be named by the advisory council.

Sections

The members of the Association shall be deemed to be divided into and representative of the following sections:—

Central stations, contractor-dealers, manufacturers, jobbers, engineers, architects, telephone companies, telegraph companies and railway companies. Each of the said sections shall be entitled to at least one representative on the advisory council of the association.

Each section shall have the privilege of nominating its representative on the advisory council. If such nominations are not received then upon proper notice from the honorary secretary-treasurer, the executive committee may make nominations to fill such vacancies.

Signing Officers

The president, or a vice-president, and the honorary secretary-treasurer shall sign and execute on behalf of the association all such contracts, documents and writings as may require execution by or on behalf of the association, with the exception of cheques, which shall be signed on behalf of the association by the honorary secretary-treasurer, or by the manager-secretary, and countersigned by the president or one of the vice-presidents.

Educational Program

During the first year it was expected that the efforts of the association would be largely confined to the organization of the various electrical groups into sections, but matters have progressed so satisfactorily that the association has been able to give its attention to the settlement of problems affecting the relations of these several sections, and the results obtained, to date, have been most gratifying.

The executive is assured of a sufficient number of moving picture films to inaugurate its policy of education amongst its members and the public, and definite announcement of these plans will be made later.

Cuts are being secured and reading matter drawn up for pamphlets which it is the intention to distribute generally,

illustrating and describing the uses of electrical appliances in the home.

The architects and builders have been approached regarding wiring and lighting matters in new buildings and the executive hopes that the close co-operation with them will result in establishing better electrical conditions in the home; pamphlets have been ordered for general distribution amongst architects and builders, the object of which is the more general installation of equipment in houses to facilitate the use of electrical household appliances.

Considerable headway has been made in improving the relations between the jobbers and the contractor-dealers, but as these particular classes of the industry have a sphere of action where the interests are, often times at variance, the elimination of previous causes of complaint on the part of one or the other or both of these bodies will be gradual; however, these efforts to date have been most successful.

The co-operation of the Montreal Electrical Club and the latter's affiliation to the Electrical Co-Operative Association under the new name of the Electrical Co-Operative Luncheon is the result of the executive's work in securing a social outlet to its activities and speaks highly of the good relations existing between electrical men in Montreal.

Company Members' Activities

In pursuance of the public educational campaign, the Shawinigan Water & Power Co., one of the affiliated interests, are to tour certain portions of the province served by its distribution lines or those of its subsidiary companies; automobile trucks on which will be mounted various kinds of household appliances and industrial apparatus will be used for this demonstration work.

Through the courtesy of the Montreal Light, Heat & Power Cons., a permanent electrical exhibit is an assured fact. The M. L. H. & P. Cons. has turned over the ground floor of its building, corner of St. Catherine and Mountain Streets, to various company members of the Electrical Co-Operative Association, to whom are extended also the privileges of its show-rooms in the various parts of the city, for purposes of demonstrating electrical appliances and educating the public in their use.

As will be seen, the main object of this association is better electrical service to the public, obtained by means of education amongst electrical men and the public; it is not intended to help any particular branch of the industry more than another, but to promote the interests of all. The scope of the association's activities will be gradually extended as the organization progresses. It is felt that, with the broad field of action before it, the Electrical Co-Operative Association, Province of Quebec, can be brought to play a great part in the development of this province's natural resources through its educational program.



Chateau Frontenac, Quebec City.

L'Association Coopérative Electrique, Province de Québec

Histoire de sa Formation, son But et ses Principes

PAR M. J. N. MOCHON

L'histoire de la formation de l'Association Coopérative Electrique, Province de Québec, est la même que celle d'organisations semblables qui existent dans d'autres parties du pays et qui sont toutes la conséquence de conditions identiques en évidence ici comme ailleurs. Dans le but d'expliquer aux intérêts électriques et aux électriciens des alentours les détails de leur plan coopératif et de leur donner les suites de l'application de ces principes ailleurs, MM. Samuel Adams Chase et W. L. Goodwin furent invités à Montréal. L'on sentait alors que des résultats beaucoup plus satisfaisants seraient obtenus et des liens plus étroits établis avec une organisation jetée sur des bases coopératives.

L'Association Coopérative Electrique, Province de Québec, s'est organisée par la suite et d'incorporation s'en est suivie sous les lois de cette province; un Comité provisoire fut nommé à qui fut confiée l'étude du but et des principes de cette Association et des devoirs des divers Comités à qui incomberaient le choix et la direction des employés. Ce Comité d'organisation forma le noyau du corps des officiers permanents élus plus tard comme suit:—

Président honoraire.—J. S. Norris, Vice-Prés. et Gérant Général, Montreal Light, Heat & Power Consolidated.

Président. — K. B. Thornton, Gérant Général, Montreal Public Service Corporation.

Vice-Présidents—J. B. Woodyat, Gérant Général, Southern Canada Power Co. Ltd., J. W. Pilcher, gérant local, Canadian General Electric Co. Ltd., M. K. Pike, gérant général des ventes, Northern Electric Co. Ltd.; F. J. Parsons, directeur-gérant, McDonald & Willson Co. Ltd.; N. Simoneau, entrepreneur-électricien, Simoneau Electric Contracting; Dr. L. A. Herdt, Chaire McDonald, Professeur de Génie Electrique, Université McGill; R. J. Beaumont, gérant général des Cies subsidiaires, Shawinigan Water & Power Co.

Sec.-Trés. honoraire—L. C. Haskell, secrétaire-trésorier, Southern Canada Power Co. Ltd.

Bureau consultatif—W. O'Brien, gérant, Dépt. des Affaires Nouvelles, Montreal Light, Heat & Power Cons., L. C. Haskell, secrétaire-trésorier, Southern Canada Power Co. Ltd; N. L. Engel, Montreal Public Service Corporation; W. J. Lynch, gérant général, Quebec Railway Light & Power Co. Limited.

Représentants des Manufacturiers — C. Duncan, directeur-gérant, Duncan Electrical Co. Ltd., Geo. Wight, directeur-gérant & Sec.-Trés., Monarch Electric Co. Ltd; C. E. Medbury, gérant local, Canadian Westinghouse Co. Ltd.

Représentants des Marchands de Gros—J. W. Pilcher, gérant local, Canadian General Electric Co. Ltd; M. K. Pike, gérant général des ventes, Northern Electric Co. Ltd; S. W. Smith, président, Electrical Equipment Co. Ltd.

Représentants des entrepreneurs-détaillants — J. A. St-Amour, entrepreneur-électricien, Montréal; F. J. Parsons, directeur-gérant, The McDonald & Willson Co. Ltd; W. B. Shaw, gérant, Montreal Electric Co. Ltd; J. M. Walkley, Henry Morgan & Co. Ltd; Wm. Rochon, entrepreneur, 454 Parc Lafontaine; R. H. Doddridge, gérant, Quebec Electric Co., Québec, P.Q.; J. Nault, Nault & Brown, Trois-Rivières,

P.Q.; W. Wiggett, Wiggett Electric Co. Ltd., Sherbrooke, P.Q.

Ingénieurs conseil—De Gaspé Beaubien, Montréal; J. M. Robertson, J. M. Robertson & Co. Ltd.

Représentants, Compagnies d'utilité publique — H. R. Mallison, Ass't Prés., Montreal Tramways Co.; J. A. Shaw, ingénieur électricien, Canadian Pacific Railway Co., W. H. Winter, surintendant du matériel, Bell Telephone Co. of Canada.

Dans le but de transiger des affaires de l'Association avec plus de diligence, un Comité Exécutif fut nommé par le Bureau Consultatif: M. M. K. Pike en devint le Président et M. W. O'Brien, Vice-président.

Subséquentement le Comité Exécutif nommait M. J. N. Rochon comme administrateur-secrétaire.

Le Comité Exécutif étudia alors la question de la constitution et des règlements afin d'établir l'Association sur une base solide et rédigea la constitution et les règlements suivants qui sont un exposé de son but, sa formation, les devoirs des divers Comités, officiers, employés, etc. d'une manière aussi brève que possible, vu l'importance de son but.

CONSTITUTION

Nom — Le nom de cette Association sera L'ASSOCIATION CO-OPERATIVE ELECTRIQUE, PROVINCE DE QUEBEC.

But — Le but de l'Association sera de:

1. Faire comprendre et améliorer les services que peut rendre l'industrie électrique au public, en renseignant et en instruisant les membres de cette industrie et en obtenant leur coopération.

2. Créer des relations plus étroites et une meilleure entente entre les Stations Centrales, les entrepreneurs-détaillants, manufacturiers, marchands en gros, ingénieurs, architectes, les compagnies de chemins de fer et autres personnes ou corps intéressés dans l'industrie électrique, dans le but d'augmenter le rendement, vis-à-vis du public, des différentes branches de l'industrie.

3. Entreprendre une campagne d'éducation de nature à encourager le public à faire un usage plus varié et plus intense d'électricité.

4. Renseigner le public sur l'importance du service à rendre par l'électricité au point de vue du développement de l'industrie et du bien-être général.

5. Encourager et mettre en pratique de saines méthodes d'affaires.

6. Chercher, par tous les moyens, l'amélioration des procédés dans toutes les branches de l'industrie électrique, y compris la comptabilité, la vente, l'annonce et l'apparence générale du magasin.

7. Donner et diriger des démonstrations, expositions et confections d'étalages, acquérir, détenir, maintenir, opérer, louer et disposer des meubles et immeubles nécessaires pour les fins en question ou toutes autres fins se rapportant aux divers buts de l'Association.

8. Venir en aide, lorsque l'occasion se présente, à une ou plusieurs branches de l'industrie.

9. S'efforcer d'obtenir un traitement équitable au capital investi dans l'industrie électrique et d'attirer le concours sympathique du public à son développement.

Membres — Toutes personnes, firmes, compagnies, associations ou institutions engagées dans la production ou la

vente de l'électricité, des appareils électriques ou des accessoires ou articles servant à ce genre de commerce, ou engagées vocationnellement ou en toute autre façon intéressées à l'emploi ou à l'étude de l'électricité, seront éligibles comme membres de l'Association.

Les candidats seront proposés par un membre, appuyés d'un autre membre.

Toutes candidatures devront être soumises par écrit à l'Association et ces candidatures seront prises en considération par le Bureau Consultatif, qui aura le pouvoir d'accepter ou de rejeter toute candidature à sa discrétion.

Le Bureau Consultatif pourra, sur résolution à cet effet, demander sa résignation à tout membre qui, selon lui, ne coopère pas d'une façon satisfaisante aux buts de l'Association. Il faudra un vote des deux-tiers du Bureau Consultatif pour adopter une telle résolution. Sur l'avis de telle résolution, le membre en question cessera, de fait, d'être membre de l'Association.

Tout membre désirant démissionner de l'Association en donnera avis par écrit au secrétaire au moins trente jours avant que sa démission prenne effet.

Assemblée Annuelle. — L'assemblée annuelle de l'Association sera tenue dans le mois d'octobre ou novembre de chaque année, à une date que fixera le Bureau Consultatif. Des assemblées spéciales de l'Association pourront être tenues sur l'ordre de ce Bureau.

Bureau Consultatif — L'Association devra élire, à son assemblée annuelle, un Bureau Consultatif qui restera en fonctions jusqu'à l'assemblée annuelle suivante, pour diriger les affaires de l'Association. Pour les fins de la représentation dans le Bureau Consultatif les membres seront divisés, par règlement, en divers groupes, chaque groupe représen-



M. J. N. Mochon

tant une branche de l'industrie. Le nombre minimum de membres du Bureau Consultatif que les membres de chaque groupe auront le droit d'élire sera spécifié dans les règlements de l'Association.

Toute vacance dans le Bureau Consultatif pourra être remplie par résolution de ce Bureau, qui pourra en plus augmenter le nombre de ses membres sur simple résolution.

Les réunions du Bureau Consultatif seront tenues sur l'ordre du président ou, en son absence, d'un vice-président ou par le secrétaire-trésorier honoraire sur requête écrite de six membres.

Le quorum du Bureau Consultatif sera de huit membres représentant au moins quatre groupes de l'industrie, lesquels groupes se trouvent définis par les règlements de l'Association.

Comité Exécutif — Les affaires de l'Association seront gérées par un Comité Exécutif sous la direction du Bureau

Consultatif. Le Comité Exécutif pourra décider de la manière de mettre à exécution les décisions du Bureau Consultatif, de façon à ne pas nuire à l'esprit de ces décisions.

Le Comité Exécutif sera composé du président, des vice-présidents et du secrétaire-trésorier honoraire de l'Association et de cinq membres qui seront élus par le Bureau Consultatif lors de son assemblée annuelle. La démission d'aucun membre du Comité Exécutif pourra être exigée par résolution lors d'une réunion du Bureau Consultatif, et un membre de l'Association pourra être élu sur ce Comité par une résolution du même genre pour remplir toute vacance.

Les réunions du Comité Exécutif seront présidées par le président ou, en son absence, par le vice-président qui sera élu annuellement par ce comité.

Des réunions régulières du Comité Exécutif seront tenues au moins une fois par mois à l'heure et au lieu que le Comité fixera par résolution. Des réunions spéciales pourront être tenues sur appel du président ou, en son absence, par le vice-président.

Quatre membres formeront quorum aux réunions du Comité Exécutif.

Avis d'Assemblée — Tous les avis des réunions de l'Association, du Bureau Exécutif, seront expédiés par la poste aux membres ou à ceux faisant partie de ces Comités ou à leurs représentants, au moins quarante-huit heures avant l'heure fixée pour ces réunions.

Officiers. — Les officiers seront : un président, trois vice-présidents ou plus, un président et vice-président du Comité Exécutif et un secrétaire-trésorier honoraire, qui feront partie du Bureau Consultatif et du Comité Exécutif.

Les officiers de l'Association, à l'exception du président et du vice-président du Comité Exécutif, seront élus à l'assemblée annuelle du Bureau Consultatif qui sera tenue immédiatement après l'ajournement de l'assemblée annuelle des membres, et ils demeureront en fonction jusqu'à la prochaine assemblée annuelle du Bureau Consultatif.

Devoir des Officiers. — Le président présidera à toutes les réunions de l'Association et du Bureau Consultatif. En son absence, un vice-président présidera.

Le président ou le vice-président du Comité Exécutif présidera à toutes les réunions du Comité Exécutif et, en leur absence le Comité se choisira son président.

Le secrétaire-trésorier honoraire tiendra un registre des débats des assemblées générales des membres de l'Association et en soumettra le texte à l'assemblée annuelle de l'Association. Il recevra tous les fonds et fera tous les déboursés sous la direction du Comité Exécutif. Il tiendra un registre fidèle de toutes recettes et déboursés et en soumettra l'état, dûment vérifié, pour adoption à l'Assemblée annuelle de l'Association.

Administrateur-Secrétaire et Employés. — Le Comité Exécutif pourra nommer pour une période de pas plus d'une année un administrateur-secrétaire qui recevra la rémunération fixée par le dit Comité. L'administrateur-secrétaire remplira les devoirs qui pourront lui être confiés par le Comité Exécutif et fera tous les travaux se rattachant aux rapports d'assemblées et il tiendra les comptes de recettes et déboursés de l'Association que pourra lui confier le secrétaire-trésorier honoraire.

Le Comité Exécutif pourra aussi nommer pour la même période et au salaire qu'il jugera suffisant les employés du dehors ou autres employés de l'Association qu'il jugera nécessaire ou judicieux.

Fonds. — La méthode de prélèvements de fonds pour faire face aux dépenses de l'Association sera laissée au Bureau Consultatif.

Auditeur — A chaque assemblée annuelle des membres de l'Association, un auditeur sera nommé pour l'année suivante. L'auditeur fera la vérification des livres de l'Association et il signera le bilan qui sera soumis à l'assemblée générale suivante de l'Association.

Amendements à la Constitution. — Tous les articles de la Constitution de l'Association pourront être abrogés ou amendés et des articles nouveaux pourront être insérés dans la Constitution par le vote des deux tiers des membres présents à toute assemblée annuelle ou spéciale de l'Association, pourvu qu'avis par écrit soit donné à tous les membres de l'Association du changement proposé à la Constitution, et cela dix jours au moins avant l'assemblée à laquelle tels changements seront soumis au vote.

REGLEMENTS

Quartiers-Généraux. — L'Association aura ses quartiers-généraux dans l'édifice Drummond, 511 Ouest, rue Ste-Catherine, Montréal, ou en tout autre endroit que le Bureau Consultatif fixera.

Groupe. — Les membres de l'Association seront censés être divisés en groupes représentant les branches suivantes de l'industrie.

Stations Centrales, Entrepreneurs-Détaillants, Manufacturiers, Marchands en gros, Ingénieurs, Architectes, Compagnies de téléphone, de télégraphe et de chemins de fer. Chacun de ces groupes aura droit à au moins un représentant dans le Bureau Consultatif de l'Association.

Chaque groupe aura le privilège de nommer son représentant au Bureau Consultatif. Si ces nominations ne sont pas reçues, après avis raisonnable du secrétaire-trésorier honoraire, le Comité Exécutif pourra faire les nominations voulues pour remplir les cadres.

Officiers Signataires. — Le président ou un vice-président et le secrétaire-trésorier honoraire signeront et exécuteront au nom de l'Association tous contrats, documents et écrits qu'il y aura à exécuter pour l'Association, à l'exception des chèques, qui seront signés au nom de l'Association par le secrétaire-trésorier honoraire ou l'administrateur-secrétaire et contresignés par le président ou un des vice-présidents.

L'objectif de la première année était la formation et l'organisation des diverses branches de l'industrie en sections, mais les résultats ont été si satisfaisant et le progrès si rapide que l'Association a pu voir à la solution de difficultés affectant les relations de divers groupes de ses membres.

PROGRAMME D'EDUCATION.

Un nombre suffisant de vues animées est assuré pour permettre à l'Exécutif d'inaugurer bientôt un programme d'éducation parmi les membres de l'Association et le public; un avis définitif sera donné plus tard à cet effet.

On procède actuellement à la rédaction d'un pamphlet qui doit être distribué parmi le public démontrant l'emploi de l'électricité au foyer et ses avantages.

Des démarches préliminaires ont été faites dans le but d'un rapprochement avec les architectes et les constructeurs visant à de meilleures conditions électriques dans les nouveaux édifices, agencement de fils, question d'éclairage, etc., et l'on a bon espoir que ces démarches auront de bons résultats; la distribution doit se faire bientôt parmi les architectes et les constructeurs d'un pamphlet d'utilité générale.

à ceux qui veulent construire et qui songent à faciliter l'emploi des appareils électriques au foyer.

Diverses assemblées ont eu lieu auxquelles assistaient les marchands en gros et les entrepreneurs-détaillants; on espère que le rapprochement de ces deux groupes aura de bons résultats; l'aplanissement des difficultés ne peut être que graduel entre des intérêts si divergeants, mais les efforts se font dans le bon sens.

La coopération du Club Electrique de Montréal et son affiliation à l'Association Coopérative Electrique sous la nouvelle nomenclature de "Electrical Co-Operative Luncheon" est une évidence très palpable des bonnes relations qui existent entre les divers groupes électriques à Montréal; le Comité Exécutif a raison d'être fier du succès de ses efforts.

SECTION DES STATIONS CENTRALES.

En rapport avec son plan d'éducation publique, la Cie Shawinigan Water & Power, un des intérêts affiliés, doit donner des expositions et des étalages d'appareils et d'accessoires électriques dans diverses parties de la province desservies par ses compagnies subsidiaires; ces appareils et accessoires doivent être montés sur des camions automobiles pour cette fin.

La Cie Montreal Light, Heat & Power Cons. rend possible l'établissement d'une exposition permanente électrique à Montréal en permettant aux diverses compagnies affiliées à l'Association Coopérative Electrique l'usage du rez-de-chaussée de son édifice situé angle des rues Ste-Catherine et de la Montagne où ces compagnies pourront donner au public des démonstrations continuelles dans l'emploi des appareils et des accessoires électriques. C'est un geste qui fait honneur à la Montreal Light, Heat & Power Cons. et dont le public aura raison de profiter.

Tel qu'on pourra le voir en parcourant la Constitution et les règlements, le but principal de l'Association est de donner un meilleur service au public par suite de l'éducation parmi ses membres et le public; aucune branche de l'industrie n'en doit bénéficier plus qu'une autre; les intérêts de tous priment; l'intention est d'agrandir la sphère d'action de l'Association à mesure que cette organisation progressera. Il y a tout lieu de croire qu'avec le vaste horizon qu'elle a devant elle, l'Association Coopérative Electrique peut jouer un grand rôle dans le développement des ressources naturelles de cette province en appliquant son programme d'éducation.



Usines Crabtree avec développement de force motrice, Howard Smith Paper Mills, Ltd - Joliette - une industrie typique de la province de Québec

Merchandising of Electrical Appliances Through a Central Station in the Smaller Communities

By GEORGE R. ATCHISON, Merchandising Manager Southern Canada Power Company.

Many articles have been written on Merchandising of Electrical Appliances and Supplies, but these have generally dealt with this subject in the larger centres. In this article we will endeavour to deal with this subject in communities of populations from 15,000 to 1,000.

The Southern Canada Power Company, Limited, operating in sixty towns, have stores in seventeen of these towns, where a general merchandising business in electrical appliances and supplies is carried on.

While these stores are also used in connection with the power and lighting end of the business, still they are conducted on a strictly merchandising basis, and are in no way subsidized by the power and lighting department. Each store must show a profit on its sales, and the gross profit thereon must be sufficient to take care of the regular overhead and return a net profit, commensurate with the money invested. In other words, each store is operated strictly on its selling ability, and is under the same overhead charges as any other dealer-contractor in these towns, thereby enabling them to compete on a legitimate basis.

The Southern Canada Power Company operate stores in towns where they have a minimum of 250 customers. As these stores are self-sustaining through their profits on merchandise sales, their advantage can be realized to the power and lighting department. More harmonious relations are made with customers owing to the fact of a local representative always being on hand to explain the policies of the company. Better collections are made and any disputes more easily settled. Again, the fact of the company having a store in these smaller towns has a tendency towards the citizens taking a greater interest and pride in the company serving their community. It might be interesting to know that in some of our smaller stores an average of \$3.14 per customer is sold in merchandise monthly, and this figure is growing rapidly each year.

List Prices Maintained

Our sales policy calls for absolute adherence to the manufacturer's list prices on all appliances, and on supplies prices are set sufficient to cover overhead charges and a fair net return. In this connection it might not be amiss to point out that from our experience, sufficient margin of profit is not allowed by the manufacturers when setting list prices. When the amount of service which must be rendered—the heavy selling expenses, transportation charges, including freight and cartage—are all added to the cost price, a very small margin is left to compensate the dealers for all their labor and effort. A fair overhead on the average electrical store will be close to 25 per cent., and in some cases even more; when it is considered that the average discount allowed by the manufacturers is in many cases not over 30 per cent, it will be realized that there is not sufficient compensation to the dealer to enable him to energetically push the sale of electrical appliances or supplies. It would be our recommendation that list prices, of course, be reduced where and when possible, but that advantage should be taken when doing so to increase the dealer's discount and make a smaller reduction in list prices.

Another difficulty on the price situation, particularly to the smaller dealers, is that in many cases it is necessary to order a considerable quantity of appliances, and take delivery at once in order to secure the lowest discount. It would seem that some arrangement could be effected where a quantity could be placed giving the lowest discount, but delivery could be extended over a scheduled period in proportion to the dealer's turnover.

Carry Quality Stock

On the question of the selection of stock to be carried, there is not a doubt but that it pays to carry only articles of quality and of which sufficient is known that the customer will have every satisfaction and a reasonable length of service without excessive repair bills, or the annoyance of their appliances being out of order when needed. Generally these articles are higher in price, but this difference can quickly be explained to the prospective customer when they are advised what they are getting for the higher price. Incidentally, the selling of only quality articles works to the advantage of the dealer, as a satisfied customer is a regular one and recommends this type of dealer to his friends.

In the methods we have used to develop our sales, we have endeavored to take advantage of every opportunity of acquainting our customers with the advantages and conveniences to be gained in the use of electrical appliances or electricity in general, both domestic and commercial. Store demonstrations are held and customers invited by special invitations to attend. We have in attendance a demonstrator who is familiar with electric cooking and has a general knowledge of the standard line of household appliances. A great deal of interest is taken in these demonstrations and many of our sales can be traced from this source. To illustrate: at an opening of a new store in one of our towns with a population of 14,000, over 4,000 people visited the store in one day.

Advantage is also taken of the Country Fairs, exhibits being arranged where electrical appliances are demonstrated.

Our newspaper advertising is taken care of through an agency, and is carefully planned. Each store is advised of the proposed schedule of advertising so that show window display may be tied in with this; we also endeavor to have a systematic circulation of folders and pamphlets to our customers, which also ties in with our newspaper advertising.

Well Organized Sales Staff

In connection with folders, pamphlets or catalogues and window display material issued by the manufacturers in the province, it is very important that these be in French and English, as a great number of users of electricity are French. In order to take care of this condition, we issue a Christmas folder in French and English, and have also issued booklets describing each household appliance in a like manner. While a number of manufacturers have issued French and English literature, we feel that the importance of this is not just fully realized. With an estimated number of 200,000 users of electricity in this province, with immediate potential selling possibilities of \$5,000,000 per year,



Office & Store at Granby,
Southern Canada Power
Co.

and increasing rapidly in volume every year, it is important that this phase of conditions be given every consideration.

We are of the opinion that no great volume of sales can be expected unless the Sales Department is properly organized with a staff of house-to-house salesmen and store salesmen who are thoroughly familiar with the operation and cost of electrical appliances. While a certain amount of business will come through the store without direct solicitation, we believe that, particularly in the case of the larger appliances, only through a systematic canvass from house to house can volume be expected. The type of salesmen used should be the best procurable, with proper compensation for their efforts. While there is a divergence of opinion as to the best plan of compensation, the general and most satisfactory plans of compensation include commission in some form. There is a marked hesitation on the part of many salesmen to accept a selling proposition, involving house-to-house canvassing. In the selling of electrical ap-

pliances, this should not exist, as the man selling electrical labor-saving devices is conferring a blessing to women in general. As a general rule, very little trouble is experienced in at least getting a kindly reception; once the use of the appliance in question is demonstrated, a very likely prospect is secured. We do not countenance forceful selling, but encourage a firmness, which, however, is not offensive. In many instances it is necessary for the salesman to help the prospect to make up her mind to purchase, but we endeavor to do this in such a way that the customer feels that she bought the appliance rather than that we have sold it.

The idea behind every sale should be a satisfied customer, one to whom you can refer, and who you can expect will advise their friends of the kindly treatment they have received and of the great utility and benefits gained through the use of appliances sold them.

We offer a very liberal proposition to our customers, inasmuch as any of our appliances, including ranges, are

Exterior St. Hyacinthe Of-
fice & Store, Southern
Canada Power Co.



placed in their home on trial. If they are not satisfied, the appliance is removed without any expense to the customer. We also encourage the sale of appliances through our time payment plan. On large appliances, twelve monthly payments are extended with 10 per cent. payment on delivery. These time payment sales are all covered by lien forms, in which we retain formal possession of the appliance until final payment is made. When the sale is made to a customer occupying a rented home, a printed notice is sent by registered mail to the proprietor, advising him that the appliance remains our property until final payment is made.

We are fortunate in having a large portion of our customers come to our stores to make payment of their monthly lighting bills, and every endeavor is made to interest them in the appliances we have on display. The cashier's desk is generally located so that it is necessary for the customer to pass show cases containing the smaller appliances, and the larger appliances located in convenient places. When a customer shows any interest, their name is handed to the outside salesman who carefully follows this up and very often effects a sale.

Courtesy

Every courtesy should be shown to customers entering the store, such as having the door opened for them when possible and thanks expressed for the call or for the business placed. When information is desired it should be given in a pleasant and clear manner, and the customer's mind should not be confused with expressions in electrical terms, but in such a way that they will readily understand and also realize why certain precautions should be taken in the use and care of their appliances.

It is very important that the stores be kept clean and all appliances and supplies properly and carefully displayed. Outlets should be arranged so that any of the appliances can conveniently be demonstrated to the customer. Each article should be priced and a policy of one price to all cannot fail to bring good results and prestige to the store.

Care For Your Windows

Show windows should be well taken care of, and every advantage should be taken of the many splendid window



Drummondville Office and Store, Southern Canada Power Co.

displays offered by the manufacturers. The displays should be changed at frequent intervals, and whenever possible an appliance in operation or some object in motion should be included.

The question of purchasing is a very important item, and close attention should be paid to this phase of the business. A quick turnover should be a prominent thought, and only a quantity sufficient to take care of this should be purchased. There are times when it might be advisable to exceed this limit, but this should have proper consideration before doing so, such as length of time money tied up, insurance, interest, etc. We endeavor to work on a turnover of six times per year. The importance of this can readily be appreciated when it is necessary for us to carry the same appliances and supplies in seventeen different stores. This means a much larger amount of money tied up in the same



Interior St. Hyacinthe Office & Store Southern Canada Power Co.

appliance or wiring device than in a store in a large community, so that a quick turnover is very essential if any profits are to be realized. This requires careful watching, and a very careful selection of the appliances or supplies to be carried. It is hardly advisable to carry anything but standard lines, specials being ordered only on customers' orders, which are not subject to cancellation.

A Frequent Inventory

We take an inventory three times a year and all material lost or broken is written off, charged directly against profits. We are also endeavoring to use these periodic inventories to help dispose of slow moving or shop-worn stock by issuing special prices and placing them in the stores where they can be readily seen.

All of our stores report their sales directly to the head office and from these a recapitulation at the end of each month shows gross profits made. A statement is then made showing all overhead charges in detail and net profits for month. In this way it is possible to keep in constant touch with our stores. We have a record of stock on hand, the amount of money invested, and our turnover on this investment.

Every year we set a quota for each store, based on a certain amount per capita, and each month a comparative statement is issued, showing the standing of each store, with those selling the largest amount per capita heading the list. This has a tendency to create a friendly competitive spirit among the different stores.

Forty Dollars Per Head, Our Aim

We also issue a monthly statement showing the number and the different classes of appliances sold by each store. This information is of course, only statistical, but it brings out quite plainly any office that is not doing its share. This

report is also very valuable for information on quantities to purchase.

We are endeavoring to perfect and increase our sales organization to take care of a total business in merchandise only of \$2,000,000 per year, and as our customers increase this amount will also increase in proportion. This amount is based on a figure of \$40.00 per head, and we feel that this can be reached if the proper selling methods are used and every advantage taken to educate people to the uses of electrical labor saving appliances. As already mentioned, it is important that the right type of salesmen be secured, and in this connection we might mention from our experience that this is extremely hard to do and requires a great deal of time and careful educating of the men employed. This is possible in the case of a central station where they have an organization able to take care of this problem, and the writer believes that before we can really hope to develop the sale of electrical merchandise and supplies to a figure anywhere near \$40.00 per head this problem must have most careful consideration. We are inclined to believe that it would be advisable for the manufacturers to decrease National advertising sufficient to allow of the expense they would incur in the training and development of electrical appliance salesmen.

The story we have to present to the users of electricity sounds almost incredible to many and the message must be carried to them by a highly intelligent type of salesman, who is able to convince the prospect and secure permission for a demonstration from which the sale, in the majority of cases, is completed.

The potential possibilities in merchandising of electrical appliances in the Province of Quebec are very great, a figure of \$20,000,000 per year being possible in the near future, with the figure increasing every year.



View of Dam of Laurentide Power Development.

L'Association des Entrepreneurs Electriciens de la Province de Québec (Section Française)

L'Histoire, les Buts et le Personnel de Cette Organisation Progressive

L'Association des Entrepreneurs-Electriciens de la Province de Québec est une association—on pourrait même dire une institution—d'un caractère et d'une influence prééminents. Il est incontestable qu'aucune publication de ce genre, c'est-à-dire destinée à favoriser d'une manière générale le développement électrique de cette vaste province de Québec,—ce foyer d'activité canadienne-française,— ne serait complète sans une exposition détaillée de cette organisation, et c'est avec le plus grand plaisir que nous introduisons nos lecteurs au bureau de direction de la section française de cette Association, et que nous réservons un espace suffisant dans nos colonnes pour présenter succinctement le personnel, l'histoire, les buts et le développement de cette branche progressive.

Il y a associations et associations. Les unes n'existent que de nom, les autres existent en fait. L'Association des Entrepreneurs-Electriciens de la Province de Québec est une Association dans le sens le plus étendu du mot, car la voie progressive qu'elle a suivie depuis sa formation l'a pleinement justifiée à faire valoir son caractère représentatif.

Dès le début, il a été reconnu qu'il existait, pour une section française d'une telle association, des opportunités incontestables pour un travail de développement profitable. Ceci se comprendra facilement si on prend le temps de noter, d'une part, les progrès rapides faits par l'industrie électrique dans la province de Québec, durant ces dernières années, et d'autre part que sur la population totale de la province de Québec, soit 2,486,500 âmes, 80% sont de langue française—indépendamment du grand nombre connaissant les deux langues.

Nous dirons ici quelques mots, au sujet du travail d'association des entrepreneurs-marchands et des circonstances qui ont amené la formation de la section française. Pour une raison ou pour une autre les associations n'avaient pas, dans le passé, obtenu le succès auquel elles avaient droit. La question de dualité de langues était une des difficultés à surmonter. Elle nécessitait des procédures en français et en anglais, et occasionnait des complications qui n'étaient pas faites pour favoriser ni l'expédition ni la coopération.

Un travail d'organisation énergique, entrepris récemment eut pour effet de stimuler à nouveau l'intérêt des entrepreneurs et marchands électriciens français, aussi bien qu'anglais. Le besoin de coopération était évident, la seule question était d'établir quelle forme celle-ci devait prendre. Il fut d'abord essayé de procéder sur les anciennes lignes, c'est-à-dire, de former une association comprenant à la fois des membres anglais et français. Il fut bientôt apparent que le même manque de succès qui avait caractérisé la première association résulterait de la répétition de l'ancien principe.

Il fut alors décidé de faire une expérience hardie et de former deux sections distinctes, l'une française, l'autre anglaise. Cette expérience s'est amplement justifiée depuis. Le grand nombre de membres que compte l'association française est une preuve que celle-ci est sur la bonne voie. A la première assemblée tenue il y a neuf mois, cinq personnes seulement étaient présentes, aujourd'hui le nombre est d'en-

viron quatre-vingt. Un appel fait en leur langue aux membres du métier français par des entrepreneurs canadiens français influents a donné des résultats auxquels on était loin de s'attendre en se basant sur les expériences précédentes.

Une bonne constitution est un point fondamental dans toute organisation vigoureuse. Sous ce rapport la constitution de cette association ne laisse rien à désirer. Parmi les articles, on trouve une définition importante qui est celle du mot entrepreneur. Un entrepreneur, au point de vue de l'association, est quelqu'un dont la principale occupation est d'employer des ouvriers électriciens licenciés, quelqu'un s'occupant de la vente d'accessoires électriques, quelqu'un qui n'est pas dans l'emploi d'autres entrepreneurs.

Le travail et le but de l'Association sont basés sur les fondations les plus solides. Son aspiration est non seulement de maintenir des rapports cordiaux entre ses propres membres, mais encore de favoriser une entente harmonieuse entre patrons et employés et de régler les différends et difficultés qui pourraient se produire avec ces derniers. Les efforts exercés par l'Association dans le but d'améliorer la qualité de la main-d'œuvre, de coopérer à la production d'une plus grande efficacité parmi les machinistes électriciens, en leur fournissant des facilités d'apprentissage et d'instruction relatives à leur métier, sont probablement ses meilleurs titres à la reconnaissance générale. Il est reconnu que l'Association possède une influence pour le plus grand bien, au point de vue de la création de rapports justes et équitables entre l'industrie électrique et le public.

Le besoin d'une telle association a pu être démontré par ceux responsables de son organisation. Il a été prouvé qu'individuellement les entrepreneurs-marchands ne sont pas à même d'obtenir l'amélioration de conditions préjudiciables à la conduite de leurs affaires. Unis coopérativement ils exercent toutefois une influence qui ne peut être ignorée. Ceci est particulièrement le cas quand des représentations sont faites sur des questions fédérales, provinciales, locales ou corporatives. Des représentations individuelles peuvent être ignorées, mais celles provenant d'une forte Association ne peuvent être mises à l'écart. La discussion de questions purement du métier est un autre point important du travail de l'Association et est destinée à favoriser une meilleure entente entre les membres eux-mêmes et avec leurs fournisseurs.

Le bureau de direction reconnaît que les pleins effets du travail d'association ne peuvent se faire sentir de longtemps encore, mais croient qu'étant donné les résultats déjà accomplis, le programme complet de réforme sera obtenu en temps voulu.

Bien que l'Association soit composée de Canadiens Français, il est reconnu par ses membres, que beaucoup de leurs problèmes et difficultés sont aussi ceux de la section anglaise. Dans le but d'arriver à l'aboutissement de l'idée coopérative, une correspondance régulière est établie entre les deux sections, des délégués des deux sections assistent aux assemblées respectives et en cas nécessaire une action commune est prise. L'Association est aussi affiliée à l'Association Coopérative Électrique, Province de Québec, et

prend part aussi au mouvement pour le développement de l'industrie électrique en général.

Les assemblées sont tenues bi-mensuellement en hiver et mensuellement en été.

Les membres ont discuté diverses questions, telles que les relations entre le "jobber" et l'entrepreneur-marchand, l'obtention de licences pour les ouvriers électriciens, la nécessité d'éliminer les intermédiaires dans la procuration de travaux, etc., mais la question principale a été celle de l'incorporation de l'Association. Un euchre a été donné dans le but d'obtenir les fonds nécessaires, et une somme de \$800.00 a été réalisée. Tous les documents nécessaires ont été préparés à la fin de la dernière session de l'assemblée législative provinciale, et un projet de loi sera introduit à la prochaine session.

L'Association a pleinement rempli sa mission à titre d'organisation provinciale. Elle a tenu des assemblées à Trois-Rivières et dans la cité de Québec et compte plusieurs membres en dehors de Montréal. Une fois l'incorporation obtenue il est proposé de former des sections dans diverses

parties de la province. A l'heure actuelle plusieurs entrepreneurs-marchands en dehors de Montréal sont déjà devenus membres de l'Association.

Ceci est une partie du travail destiné à prendre une grande expansion, et qui reçoit une considération attentive de la part du bureau de direction.

La nécessité d'avoir un chef jouissant de la confiance du métier en général, fut reconnue de bonne heure. Monsieur N. Simoneau, qui fut élu président, est probablement le plus ancien entrepreneur-marchand de Montréal. Certains des principaux entrepreneurs-marchands ont appris leur métier sous sa tutelle, et quoique peu disposé à prendre la direction il a reconnu que sa longue expérience pourrait être utile à l'accomplissement de la bonne oeuvre. Les autres membres du bureau de direction sont: vice-président, M. W. Rochon; secrétaire, M. J. C. L. Marcou; trésorier, M. J. A. St-Amour; directeurs, MM. J. J. Valois, P. E. Boissonneault, R. Demers, M. Pelletier, J. O. Beaulieu, J. N. Tremblay, et H. Truchon; représentants à l'Association Coopérative Electrique, Province de Québec, MM. N. Simoneau, Wm. Rochon et J. A. St-Amour.



Mr. J. A. Anderson



Mr. N. Simoneau



Mr. W. Rochon

How the English Speaking Contractor-Dealers are Organized in Montreal and the Province

The History, Aims, Accomplishments and Personnel of a Progressive Organization

Like their French-Canadian confreres, the English-speaking electrical contractor-dealers have found the path of organization beset with many difficulties. Several years ago an association composed of French and English members, did a certain amount of good work, but truth to tell there was little vitality in the association, the main portion of the burden being borne by three or four members.

The result was that the association simply faded away, like many other societies that commenced with high aims, and then collapsed because of the lack of interest after a brief period. In an article dealing with L'Association des Entrepreneurs-Electriciens de la Province de Quebec, we refer to the dual language problem. Only those who have taken part in meetings can appreciate the difference as it was then present—a difficulty that obviously had to be surmounted if unification was to be maintained. The hard-

ship of expressing opinions in a different language was a decided handicap to the general advancement and discussion of the policy.

Contractor-dealers were alive to the need for co-operation in connection with the many problems in their business. Effective organization work undertaken proved to be the needed spark to kindle the flame of enthusiasm, and it was decided to form two organizations—French and English—independent of one another, but co-operating on all matters of mutual interest. This has proved a most satisfactory solution of a problem which threatened the existence of the entire body. While each section looks after its own interests, a committee has been formed, consisting of representatives of both sections, with the title of Committee for the Betterment of Trade Relations, whose duty it is to take up with the distributing houses, power companies, etc.,

any complaint by contractor-dealers, either as individuals or collectively.

Two Sections.

The Electrical Contractor-Dealers' Association of the Province of Quebec was formally organized on December 20th last, and at the same time a Montreal English Section was formed. Two constitutions and two sets of by-laws were adopted. The constitution and by-laws for the provincial body define the purpose of the Association as "to promote the interests and welfare of the electrical trade generally". As in the French organization, it is aimed to establish self-governing sections throughout the Province.

Those eligible for membership must be reputable bona fide electrical contractor-dealers,—thus maintaining a high standard of membership as far as the trade is concerned. In order to safeguard this rule, all applications for membership are investigated by a membership committee who report their findings at a meeting before a vote is taken on the application. The constitution and by-laws of the Montreal English-speaking Section are based on those of the Provincial Association, with such amendments as to meetings, etc., as facilitate the working of the section.

A matter which has been a more or less vexed question for some time past is that of sales by jobbers to consumers at the same prices as to contractor-dealers. In this connection it is recognized that the trade will have to work out its own salvation, but the general consensus of opinion among the contractor-dealers is that in the interests of mutual co-operation and in furtherance of the progress of the whole industry, some preferential arrangement should be arrived at by the jobbers and loyally adhered to.

At the meetings of the Association several instances were given where consumers were able to obtain from jobbers electrical goods and fittings at prices equal to, and even below, those quoted to contractor-dealers. The members expressed their opinion, in no uncertain manner, as to this method of trading. The contractor-dealer, it is held, performs a very useful function in the electrical industry, and is entitled to fair treatment at the hands of manufacturers and jobbers. The members, in fact, feel they are entitled to protection in every way, and that it is to the interest of the industry generally that the contractor-dealer should be given a square deal.

Solving other Problems

The employment by individuals of workmen to do work which really should come within the jurisdiction of the contractor-dealer is another matter which has been before the members. As a direct result of persistent agitation by the Association, an Act was passed last session to come into effect on proclamation by the Lieutenant-Governor-in-Council, for the better safeguarding of all electrical installations against fire risks.

It is laid down that the Minister of Public Works may appoint a board consisting of three competent electricians not under 25 years of age, with at least five years' experience as journeymen electricians, and able to speak and write French and English correctly. The following gentlemen have been appointed to this board: Mr. J. N. Mochon, Mr. N. S. Walsh of Montreal, and Mr. J. B. Dorais of Levis. P. Q. Their duties are to examine electrical and heating installations; examine men desirous of becoming electricians, issuing certificates of competency, and licenses; to hold examinations for the purpose, and to draw up programs for the examinations, with forms and other documents; collect fees, keep registers, and direct and facilitate the work of the inspectors.

After May 1, 1921, every new installation for light, heat

or motive power, and heating systems in public buildings, must, under the Act, be submitted for approval. Except in special cases no person or company may carry on such business or undertake or work at the installation of wires, conduits or apparatus for the transmission of electricity, production of light, heat or motive power in this Province as a contractor or journeymen electrician, unless a license to do so has been obtained from the examiners. The Act is retroactive as to heating systems in public buildings, whose owners must obtain a certificate from one of the inspectors. No alterations can be made to such a plant except by or under the supervision of a licensed person.

Inspectors may declare electric or heating systems already in a public building to be defective, and order necessary alterations.

Must Post their Licenses.

Companies and contractors must post their licenses in their offices and journeyman electricians must always carry



Mr. J. M. Walkley

a copy of their certificate. These are granted yearly, and must be renewed between May 1 and 15 each year. Companies outside the Province must obtain a temporary license to carry out work here.

A minimum fee of \$10 is charged for examining installations, or at the rate of one-half of one per cent on the value, while outside contractors must pay one per cent, with a minimum of \$50.

The licenses to be issued include license A for journeymen electricians, fee \$5 and \$2 for renewals. The fee for companies is \$25 a year, under license B. Journeymen electricians with at least five years' experience, under license C, secure a diploma permitting the inspection of electrical installations and all apparatus connected therewith, with a fee of \$25 and \$5 for renewals.

Moving picture operators, not less than 18 years of age, are given license D, and pay a fee of \$3 and \$1 for renewals. Janitors and other men employed about a public building, having a knowledge of electricity, can obtain license E, for which there is no fee, and can then do repair and maintenance work on their installations.

The National Electric Code will form the basis for examination of electricians or other persons, who may also have to give practical demonstrations.

Among public buildings specified as coming under the

Act are skating rinks, and boarding houses capable of receiving at least 15 boarders, as well as stores employing at least 10 clerks.

While this is an accomplishment in itself and there have been improvements in certain directions, yet the members feel there are many things remaining which can be remedied in the interests, generally, of the trade.

The Only Method

Co-operative action is the only effective method of obtaining the desired results. This co-operation will, it is hoped, be greatly strengthened by the formation of sections in other parts of the Province, although in this respect the French-Canadian Association has a wider field by reason of the great majority of the contractor-dealers being French speaking. But the main point is to engender in the minds of those in the trade a real interest in questions which vitally effect their means of making a livelihood. Unless there are those who will spend money and effort in this direction there is no hope of defending the industry against unfair legislation or practices, or of securing redress in matters which demand amendment.

To do really effective work, such an Association must receive the whole-hearted support of the members of the industry. Every member of the industry is affected by the various problems, and it is a matter of self-interest for each to do his share in making the Association an outstanding success.

The Association is affiliated with the Electrical Co-operative Association, Province of Quebec, and the bond between the two bodies is made more effective owing to the fact that Mr. J. N. Mochon, manager-secretary of the co-operative association, is also secretary of the Electrical Contractor-Dealers' Association. This appointment was made only recently.

It is important, of course, to have representative officers. Mr. J. M. Walkley is the president, and Mr. J. A. Anderson the vice-president. The executive committee consists of Messrs. E. J. Gunn, C. Thomson, F. J. Parsons, W. B. Shaw, and L. P. Mead. The representatives to The Electrical Co-operative Association, Province of Quebec, are Messrs J. M. Walkley, W. B. Shaw, and F. J. Parsons.

Storage Battery Manufacturing Plant at St. Johns

Outstanding among activities in the electrical industry in the Province of Quebec is the manufacture of storage batteries. At St. Johns, Que., which is situated twenty-seven miles via G. T. R. south-east of Montreal, the storage battery works of the Hart Battery Company, Limited, is located. This company operating under its former name Canadian Hart Accumulator Company, Limited, was the first of its kind in Canada and has maintained a premier position in the production of storage cells for all classes of service.

Contracts for building were first made in the summer of 1914, just prior to the outbreak of the great war, and notwithstanding the many obstacles incident to war-time conditions, the business has grown and prospered and today has a complete and well-equipped plant.

The parent of the Canadian company, the Hart Accumulator Co. Limited, of Stratford, London, England, has had many years experience in the art of manufacturing storage batteries, and naturally the Canadian company has the benefit of this broad experience. The Hart Accumulator

Company, Limited, are one of the oldest manufacturers of storage batteries in the world. During the war they furnished cells to the British army and navy for all classes of work, particularly electric storage cells for use in submarines. They have also had a large share of the business for central station, isolated plant, electric vehicle, automobile starting and lighting, telephone and telegraph, wireless, and other uses for which storage batteries are employed.

Equipment is now installed at St. Johns for the making of every part of the various types of cells manufactured, with the exception of hard rubber and glass parts. A complete wood-working plant has been provided so that all wooden cell containers, packing-cases, etc. are made on the premises under expert supervision. The company also make their lead moulds in their own tool shop. Suitable types of cells are made in this plant for many purposes, among which are the following: large central station, central station switching and emergency lighting, home and farm lighting, electric vehicle, railway coach lighting, automobile starting and lighting and ignition, railway signal, fire and other alarm systems, telephone, telegraph, industrial truck, medical appliance, experimental work, research work, aeroplane.

Two years ago a reorganization of the Canadian business was necessary as, due to war conditions, it was impossible to properly perfect the original organization. Under the new regime, the business is managed entirely in Canada by a Canadian Board, consisting of three directors, all of whom are conversant with Canadian conditions. Last year the wisdom of this step was reflected in the forward strides made by the company, which necessitated doubling the size of the works, and increased the output 160 percent over the previous year.

New Steel Transmission Line of Bathurst Lumber Co.

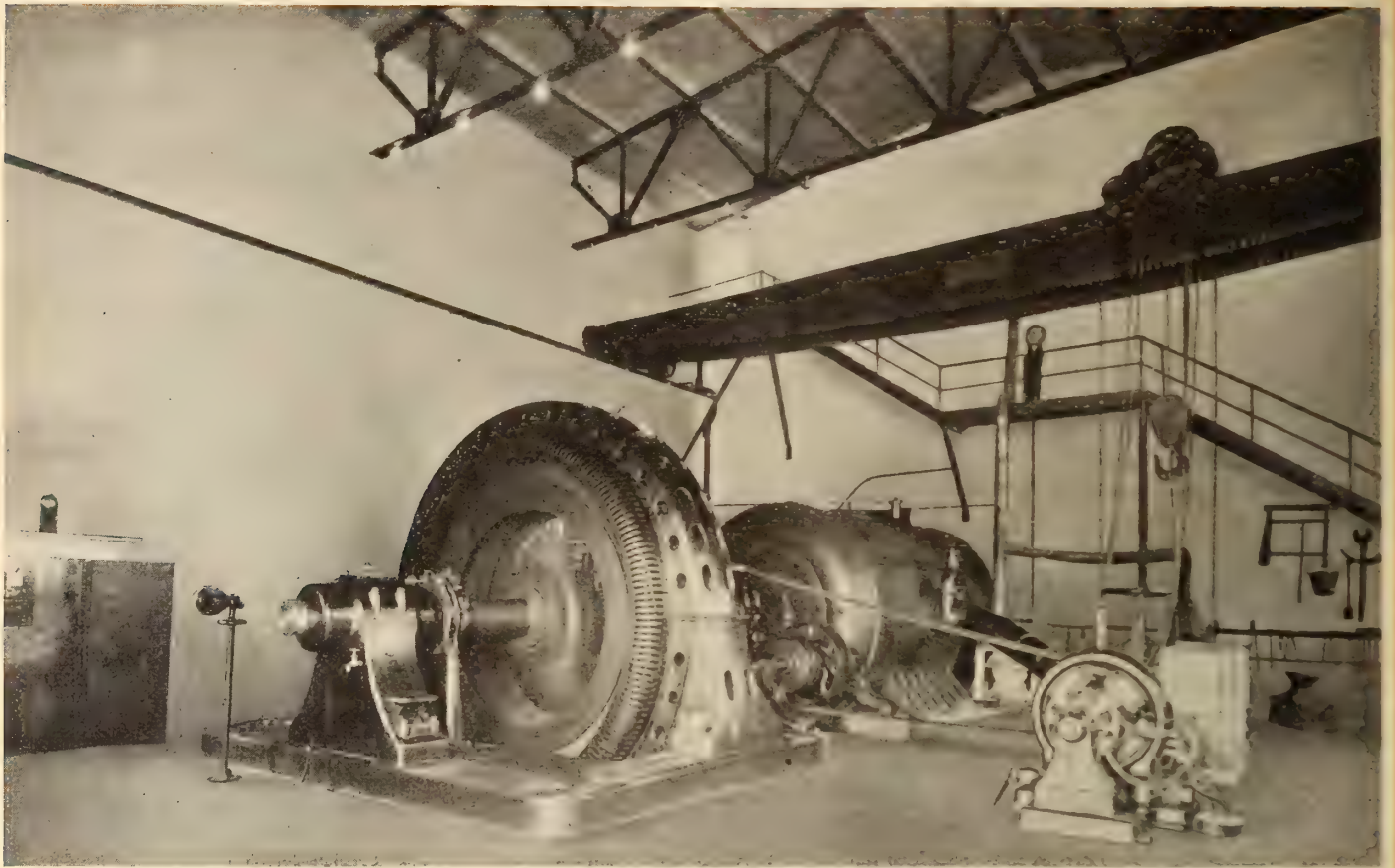
The new steel transmission line of the Bathurst Lumber Co., of Bathurst, N.B., may be described as an "all Made in Canada" line. The steel poles and towers were manufactured by the Canadian Bridge Company, Limited, of Walkerville, Ont., the insulators were the product of the Canadian Porcelain Company, of Hamilton, Ont., and the cable was made in Montreal by The Eugene F. Phillips Electrical Works, Limited.

The line, which is about twenty miles long, runs from the new hydro-electric power house of the Bathurst Lumber Company, at Grand Falls, on the Nipisiquit, to the pulp and paper mills at Bathurst.

The standard poles are spaced 400 feet apart and are from 32 feet to 45 feet to the lowest arms. The towers, which are used on dead ends and at the railway crossings, are from 32 feet to 61 feet to the lowest arm.

No. 0 hard drawn copper cable is used as conductor. This is pulled up at a tension of about 750 pounds at 65 degrees F., giving a sag of approximately 6.5 feet in the 100-foot spans. One complete transposition is made on the whole length. The operating voltage is 33,000 volts. Mr. E. F. Marchand, of the Marchand Electrical Co., of Ottawa, acted as superintendent of construction for the contractors and owners.

Mr. F. E. Jones, 124 Germain Street, St. John, has been awarded the contract for electrical work on a store and apartment building being erected for Mr. W. L. Walsh, 329 Haymarket Square.



Interior of Power House, Upper Dam, Montmorency River—Q. R. L. H. & P. Co.



Power House, Montmorency Falls—Q. R. L. H. & P. Co.

The Electrical Contractor in the Province of Quebec

A Review of the Situation that will Pave the Way for a Better Understanding. Conditions in the Contracting Industry Distinctly Improving.

By W. B. SHAW

Since the inception of the interior electrical installations, the electrical contractor here has been the "goat" for all and sundry. The general builder obtains his figure, bases his price upon same and after successfully obtaining the contract for the building proceeds to farm around for a more favorable estimate. The architect has hidden his lack of knowledge behind the universal fetish, "provide certificate from Underwriters," not knowing that devious methods might legitimately pass the Underwriters without, however, giving the control and effects desired. The jobber, and even the manufacturer in some instances, has sold material to the consumer "Smith" or "Jones" at the same figure (or substantially the same figure) as to the legitimate electrical contractor: sometimes going so far as to sketch him a plan (sic!) on a piece of his counter wrapping paper showing how to do the work and advising him to "go to it"—that no contractor was necessary. The merchant would bribe a passing line-man, who might be an employee of one of the power companies or the telephone company, requesting him to drop in at night and instal him a couple of lights in his own time.

Each and every case exemplified pure downright "meanness": no "live and let live" idea about it at all, and the spirit of co-operation was nowhere.

The contractors themselves were "de trop", Montreal boasting about seventy-five French-Canadian legitimate contractors and about thirty-five English-speaking ones, to say nothing of about fifty others nondescript. This is more than contained in Buffalo and Boston put together. The first mentioned city being a centre for Niagara power is a good one for the contracting industry, while the second city named can progress with building operations the year round, which Montreal, owing to its climate, cannot well do.

This surplus of contractors is still a plague spot but seems likely to continue. Let us now look at what steps are being taken to remedy some of these disadvantages enumerated:

The Builders' Exchange have established a code of ethics which has eliminated to a considerable extent what is termed "farming" of contracts by the general builders.

The architects have taken of late much more interest in the electrical installation pertaining to their erections, and where there is a large building of importance employ consulting electrical engineers to make their lay-out and draw up their specifications.

The jobber and distributor has been brought into closer touch with the contractor through their mutual associations, which are being coached and advised by the Co-Operative Development Association of the Province of Quebec.

Combined committees consisting of French and English contractors are meeting the jobbers from time to time and slowly remedying their differences, finding in the process that the "other fellow" is not a half bad chap when you really get to know him and understand some of his peculiar difficulties too.

The "cheap-jack" merchant referred to previously will

be brought sharply to book by the new Provincial law of the Province of Quebec, which provides that all electrical work must be performed by a licensed contractor, who in turn must only employ licensed wire-men who have undergone an examination. This law is passed and will likely be put into force this coming Fall.

The Labor question is somewhat different to the U.S. A. and other provinces inasmuch as the contractors have always favored the "open shop" idea and such still applies to those contracting for interior installation work, with possibly only one firm excepted. This finds the most favor as being better suited to our mixed population where the contractors' wire-men generally embrace both French-Canadian and English-speaking wire-men. As a matter of fact, the wire-men themselves have never evidenced any very keen desire for **International** Unionism, in the interior installation section.

It is hoped and believed that the powerful influence of the Co-Operative Development Association of the Province of Quebec, with its membership embracing as it does power companies, manufacturers, jobbers, contractors and engineers, will be of assistance by their influence, advice and otherwise in maintaining commercial peace and bettering the lot of the electrical fraternity, among which is the contractor who heretofore has sustained the bulk of hard knocks. The electrical contractor on the other hand must be prepared to help himself by submitting to the education so freely offered in the pages of the Electrical News as well as other publications, to say nothing of verbal advice given through conferences, association meets, etc., and his figuring.

Quite a number do not seem to realize what the words, "Overhead Charges", mean, and it is ridiculous and humiliating to the craft to hear of their bids varying to the extent of 80 per cent.

Another difference existing in Quebec Province in contra-distinction to the Province of Ontario is the number of straight contractors who are not contractor-dealers. The former have practically no appliance stock, such as heaters, flat-irons, washing machines, vacuum cleaners and the like—probably no show-room or shop window—yet various manufacturers are continually flooding such firms with reams of paper propaganda relative to "How to sell goods," "How to decorate your shop window" (that they do not possess), etc., etc., A little information on such points might well be sought by some manufacturers and save themselves expense, not to mention possible irritation to their proposed clients.

As a matter of fact, to provide for this certain large firms have established a permanent exhibition in the Montreal Light, Heat & Power Company's building, corner of Mountain and St. Catherine Sts., where there are booths to show and quote goods, as well as demonstrate them, to any customer whom the electrical contractor sees fit to take in, or send there. No goods are sold, but the client's contractor

is notified and the sale actually made through the contractor.

On the whole the contracting industry is distinctly bettering. There is a contractors' association now of some power in two sections, French-Canadian and English-speaking, keeping harmoniously in touch with one another and working together. Advice received from delegates of sister associations will no doubt shortly make a better credit standing for the contractor. The question of the contractor's credit has been a sore spot, but it is thought that this can be materially altered for the better in the near future, and an improvement made on the unfortunate position they have held heretofore.

Now that the Unions pertaining to the building trades who have been blocking building operations locally (notably the bricklayers) have come to an understanding, it is hoped that the building schedule turned down on May 1st

will be resurrected soon and building operations proceeded with. If the capitalist who usually invests in building has not placed his money in bonds or elsewhere, we hope for a commencement of building again. This will mean better business for all in the electrical industry locally, including the manufacturer and jobber, as well as the contractor who has been on the "rocks" for work since the beginning of the year.

It must not be overlooked that the building industry is one of our key industries, possibly the principal key industry at that.

The Underwriters' Inspection Bureau under Chief Inspector Chas. M. Tait is giving contractors attention and the power companies are rendering efficient service and have no shortage of power.

When the ban lifts, which for some unforeseen reason appears to hover over business at present, things should go forward better and more efficiently than of yore.

A l'Entrepreneur-Electricien Devrait Revenir de Droit la Vente des Appareils Electriques

PAR M. N. SIMONEAU

Président de l'Association des Entrepreneurs Electriciens de la Province de Québec,
(Section Française).

La situation de l'entrepreneur-électricien dans la province de Québec a été entourée de difficultés comme ailleurs depuis que l'usage de l'électricité a commencé à se généraliser; cette généralisation a été si rapide que les intéressés n'ont pas eu le temps de songer à l'aplanissement de ces difficultés, étant occupés continuellement à des questions de production. Ces difficultés sont multiples, tant à l'intérieur qu'à l'extérieur de leur cercle; le manque d'organisation et de coopération à l'intérieur a été la cause principale de l'état actuel, tandis que le manque de protection dans divers sens a empêché le développement de cette branche si importante de l'industrie électrique.

L'électrification de l'atelier a été la première manifestation de la commercialisation de l'électricité et a été suivie par l'électrification du foyer; dans les deux cas le développement a été très rapide et a dépassé les espérances de ceux qui, il y a à peine une vingtaine d'années, avaient prévu l'importance de cette industrie.

L'électrification de l'atelier et la généralisation de l'usage des moteurs électriques a donné de suite raison à l'existence de l'entrepreneur-électricien qui a vu depuis à l'installation, à la réparation et à l'entretien de ces appareils. L'utilisation de l'électricité comme éclairage électrique dans les maisons a fait dévier un peu l'application de l'énergie de l'entrepreneur-électricien, mais l'électrification du foyer ne s'est pas faite aussi générale et aussi rapide ici que dans d'autres milieux moins peuplés et où les conditions électriques ne sont pas meilleures qu'ici au point de vue du consommateur; cette situation paraîtrait, de prime abord, être due au manque d'intérêt de la part de l'entrepreneur-électricien à cette importante question de l'électrification du foyer: il est demeuré plutôt entrepreneur que marchand et la question qui prime aujourd'hui paraît être celle-ci:

"Le commerce des appareils et accessoires électriques pour l'usage de la famille doit-il demeurer entre les mains des électriciens qui sont la voie logique entre le manufacturier et le consommateur, ou demeurera-t-il, comme à présent, entre les mains des quincailliers, pharmaciens, épiciers, magasins à rayons, etc., en plus des électriciens?"

Ces commerçants étrangers à l'industrie électrique qui paraissent connaître mieux que l'électricien la question importante de l'étalage de la marchandise sont dépourvus d'ordinaire des facilités que possède l'entrepreneur-électricien de donner satisfaction à sa clientèle au moyen d'un atelier et de connaissances électriques; ce dernier n'a pas toutefois étudié le côté commercial de son commerce comme l'a fait le marchand et par suite s'est laissé devancer dans cette voie.

Ne serait-il pas temps pour l'entrepreneur-électricien de considérer sérieusement la question du détail des accessoires et des appareils électriques, dans le but de garder pour lui-même le droit légitime que lui donnent ses études de l'électricité, son expérience et le succès qu'il se doit à lui-même de faire dans l'occupation qu'il a choisie? Le rapprochement récent entre les marchands de gros et les entrepreneurs-détaillants devrait produire ces résultats: ces heureuses conséquences seraient non seulement à l'avantage de l'entrepreneur-électricien mais aussi du manufacturier et du marchand de gros, par suite de la stabilisation de cette industrie et l'utilisation de l'entrepreneur-détaillant comme agent de vente auprès du public avec qui il est en contact régulier dans l'accomplissement de ses devoirs et par sa fonction même. Le public surtout aurait le bénéfice d'un tel résultat, car l'électricien est en meilleure position pour conseiller sa clientèle sur une question électrique qu'un quincaillier, un pharmacien ou un épicier, de même qu'il est en meilleure position de résoudre ses difficultés, vu sa familiarité avec les appareils et accessoires électriques. Il y a lieu d'espérer et de croire qu'il y aurait moins d'accessoires électriques de qualité inférieure offerts au public et par conséquent une plus grande généralisation de ces appareils si le public les achetait de ceux qui sont en position de leur donner une bonne direction et de sages conseils.

En somme, si vous êtes malade vous allez voir le médecin, vous consultez l'avocat sur une question de droit, l'architecte sur une question de dessin ou de construction d'un édifice, comment pourriez-vous vous attendre à de sages conseils sur une question électrique, lorsque vous en demandez la solution au premier venu?

Lighting and Power Equipment of a Modern Knitting Mill

The new mill of the Knit-to-Fit Mfg. Co. is located on Parathenis Street, Montreal, Quebec. Owing to the large volume of business which the company is receiving, they found it necessary to have a new plant designed and built for their special requirements, as the existing plant could not be increased to meet their demand owing to the lack of space. A site was obtained on Parathenis and Ontario Streets, where a new plant has been erected and is now completed and in operation.

The new plant consists of main mill building three stories and a basement of mill construction. Wet finishing building, fireproof construction of two stories. This is the only building of this particular design in Canada, and is considered to be the most modern type for this service, several patented methods being incorporated in the structure to obtain the greatest efficiency and the best lighting and operating conditions. The new methods used improve the working conditions for the employees to a great extent. A very modern power house has been included in the plant.

The service for lighting and power is obtained from the Montreal Light, Heat and Power Consolidated. The motors are 3 phase, 550 volts, 60 cycle, and the lighting system is 3 wire, 110/220 volts, 60 cycle. The machinery is all motor-driven from line shaft with motors arranged for group drive. The complete electrical installation has been designed to be increased 100 per cent. at a later date when the plant is extended.

The lighting system is designed to give the maximum illumination on the working plane without shadows and glare. The Benjamin R.L.M. reflectors were used throughout with Westinghouse Mazda C. bowl frosted lamps. The reflectors are supported with wrought iron pipe and Benjamin fixture aligners in the outlet boxes. This gives a very substantial and permanent equipment for factory work.

A special moisture proof installation was designed for the Wet Finishing building. This installation consists of conduit with an extra coating of enamel, and special vapor-proof con-

dulets. The control is located in the offices on each floor outside of the damp area. Benjamin vapor-proof fixtures were used with 300 watt Westinghouse Mazda C. lamps for the lighting. The power plant lighting consists of R.L.M. reflector units and Crouse-Hinds vapor-proof condulets around the boilers. Yard lighting has been provided throughout the entire plant.

A special system of lighting has been installed for the night watchman throughout the plant. This eliminates the fire hazard with the use of oil lamps and is much more satisfactory than flashlights.

Benjamin-Starrett dead front type panelboards have been used throughout. These panels are of special design and suitable for mounting on the columns.

The lighting of the sewing machine tables was accomplished with Benjamin R.L.M. reflectors and Westinghouse Mazda C. bowl frosted lamps, giving an average of 5 foot candles.

The switchboard consists of Square D steel panel boards bolted together, supported by angle iron and wrought iron pipe frame. Each feeder for lighting and power is protected by a Square D safety switch box. The mains for lighting and power are contained in the two gutter boxes on the front of the switchboard. All conduits leading to the individual feeder switches are mounted at the rear of the switchboard.

The lighting service is controlled and protected by a conduit, 3 pole, 400 amp., 220 volts full automatic oil circuit breaker. The oil circuit breaker is supported by a wrought iron pipe frame. The watt-hour meters shown on the panel are for recording the power used for lighting. The panel boards are set out from the wall three feet, which gives ample space at the rear for working on the conduit and making any alterations or extensions. All live parts of apparatus are entirely enclosed on the front and the rear of the board. This equipment is entirely fireproof. By the use of the Square D enclosed safety switch for the protection of feeders it is possible to lock the switch in the off position to per-



FIGS. 1 & 2 Two views of illumination in Montreal Knitting Mill

mit any repairs or work to be done on the feeders, and prevent any accidents.

With this panel board a very flexible installation is obtained. Additional panels may be added at a very slight cost. Additions and extensions may be made to the equipment, without a great deal of difficulty, the maximum amount of flexibility is obtained, which is very important in industrial work.

The illustration in Fig. 3 with this article represents the

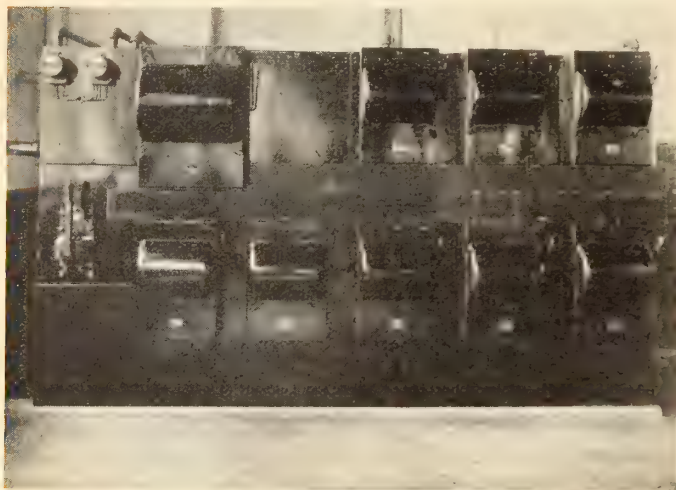


Fig. 3—The Safety Switch Board

first all-steel Square D safety switchboard installed in the province of Quebec.

The plant was designed and supervised by the W. J. Westaway Co., Ltd., of Hamilton. The Montreal office of this company is located in Room 400, McGill Building. The Jack Bros. Electrical Construction Co. of Hamilton installed the electrical wiring and apparatus.

We are indebted to Mr. V. K. Stalford, of Hamilton, for the information contained in this article.

Mr. J. A. St. Amour, 2171 St. Denis Street, has been awarded the contract for electrical work on a school building recently erected on Drolet Street at a cost of \$140,000.

Letters to the Editor

Quebec, August 15th, 1921.

Editor Electrical News,—

Had great pleasure in reading your editorial of July 15th.

Most of the original opponents of the Municipal Operators that were members of the C. E. A. are no longer members owing to the fact of their plants all having been absorbed or otherwise disposed of to the Government or Municipalities.

The principal objectives of both associations are identical.

Perhaps an amalgamation could be arranged and operated in two sections, say, Ontario and West, Quebec and East. Then the one organization might have considerably more influence than either association has now.

There is a lot of hot air preached about co-operation, but very little practiced. Why not co-ordinate both private and public interests?

Yours very truly,

A. P. DODDRIDGE.

* * *

Moose Jaw, August 8, 1921.

Editor Electrical News,—

Referring to your letter of July 7th and your editorial of July 15th, I certainly think that your suggestion of forming one large central station association, representing this industry throughout the Dominion of Canada, in place of two or more associations now in existence, is a very good and timely one.

I am very much in favor of such an association, and I believe that every central station official of Western Canada will agree with me in this for, as you are aware, municipal ownership predominates in Western Canada, and at present we have no organization through which we can get together.

Yours very truly,

J. D. PETERS,

Electrical Supt.

Application of oil circuit breakers is the title of a new publication issued by the Westinghouse Electric & Mfg. Company, known as Special Publication 1643. This includes a complete discussion of the application of circuit breakers, together with an outline of the characteristics of several types of oil circuit breakers.



The Hull Electric Company have harnessed the rapids of the Ottawa River, just above the Capital. An air view of this development.

Prominent Manufacturing Industries of Very Varied Nature

Large industries are legion in the Province of Quebec. We have already mentioned types of these, such as the J. R. Booth Lumber Company, the W. C. Edwards Lumber Company, the E. B. Eddy Co., Price Brothers & Company and others. Quebec province may be said to be the centre of the pulp industry of the continent, where the operating companies include such well-known names as The Spanish River Pulp and Paper Mills; Mattagami Pulp & Paper Company; The Laurentide Company; The Chicoutimi Pulp Company; Riordon Pulp & Paper Company; Howard Smith Paper Mills, etc. The vast majority of these industries have considered it advisable to develop their own hydraulic and hydro-electric power, so that the Province of Quebec has some of the most complete and up-to-date industrial establishments to be found anywhere on the continent.

But the province is noted for the variety of its industries, as well as for their prominence. For instance, the Ames-Holden-Mcready Company are said to be the largest manufacturers of footwear in Canada. The Dominion Rubber System and the Miner Rubber Company are representative of their industry in Canada. Penman's, Limited, whose product is known the world over, have a fine plant at St. Hyacinthe. The Dominion Textile Company, and the Canadian Connecticut Cotton Mills, Ltd., situated, respectively, at Magog and Sherbrooke, are very typical industries. Examples are shown on this page; to the right, above, the plant of the Dominion Textile Co.; to the left, below, Penman's, Ltd.; at St. Hyacinthe, and on the right, below, the Miner Rubber Co. and the Imperial Tobacco Co. of Granby.



Quebec, the "Gibraltar of Canada"

Quebec, "the Gibraltar of Canada," has stood for nearly 400 years as a sentinel city guarding the gates of the majestic St. Lawrence. A dominant figure in the history of North America, it occupies a unique place in the annals of our Dominion. This old city is our surest link with the past and brings us into vivifying touch with some of the greatest events that have profoundly affected America, Europe, and even the world itself, during the last five centuries.

It was in the year 1535 that the present site of Quebec was first seen by a European. In September of that year Jacques Cartier moored his ships in the St. Charles River, and landed at the Indian village of Stadacona. This first hardy adventurer could not have dreamed of the tide of civilization and the mighty growth that were to follow him, yet he must have felt that the newly discovered country was a land of promise, for six years later he came again and attempted to form a settlement at Cap Rouge. The hostility of the Indians proved a formidable obstacle to this enterprise and it was soon abandoned.

The actual founding of Quebec was carried out by Champlain in 1608. He built a combined house and fort in what is now the lower town, and witnessed the arrival of the first immigrant, with his family.

The years which followed the building of the fort and the founding of a settlement by Champlain were fraught with bitter struggles for the little colony. Just twenty-one years after, (1629), the city was surrendered to Sir David Kirke in the name of the British King; three years later it was restored to France, where it remained without dispute for the next 60 years. In 1690, during the regime

of Frontenac as Governor, the British again made an unsuccessful attempt to restore the city to the English, but Sir Wm. Phipps was defeated.

The wreck of Sir Hovenden Walker's fleet in the St. Lawrence in 1711 marked the beginning of forty-eight years of peace. In that time Quebec prospered greatly, various manufactures became firmly established and the settlement became known as the Capitol City.

This peaceful progress was fated not to go on uninterruptedly—the drums of war had not been stilled. The struggle was resumed, and in September, 1759, the most fateful event of our history was enacted when Montcalm was defeated by Wolfe on the Plains of Abraham. As a result of this battle Canada was formally ceded to England by France in 1763. It appeared then that the city would prosper in peace on the fruit of the abundant natural resources of the surrounding country; and, in the main, it has been so allowed to do; the attacks of the American rebels in 1775 were bootless and the war of 1812 passed it by with scarce more than a flurry.

Quebec, however, has always seemed to be the setting chosen by fate for those matters, whether of historic or of passing interest, that go to make up the story of our national life; of later years, perhaps these have not been so striking, but they teem with interest. The first vessel (the Royal William) that ever crossed any ocean steaming the whole way was built in the city's dockyards; the present walls and citadel were built after plans approved by Wellington in the period of 1823-1832. The first Canadian contingent embarked from Quebec in 1899 for South Africa. In 1914 another first Canadian contingent left

Quebec



The Quebec of Two Centuries Ago.

This picture dates back to the year 1700.



from Quebec for France. One of the wonder bridges of the world, an enduring monument to engineering skill, crosses the St. Lawrence near Quebec.

"We may stand upon some point of vantage and gaze away across the Lower Town—"old Quebec". Under the blue Canadian sky comes out sharply the pale gray of the citadel; the duller gray of the cliff-face, streaked with rust color and splashed with light green; the black guns bristling in the ramparts and batteries; the brown streets; the roofs of shining tin; the gilded steeple; with here and there a billow of thick foliage; the blue-green flood of the River St. Lawrence; the white and emerald of the tributary farms and villages, and the sombre purple setting of the remote surrounding hills."

A half turn—a different prospect greets us, and our minds receive an impression of bustling industrial activity. Our gaze wanders from a view of immense factories and of busy streets to the crowded shipping of the river. In the distance, stretches out the shining steel of railway lines;



The Quebec Bridge.

perhaps we see the faraway white foam of a waterfall and marvel at its conversion to the use of man.

The juxtaposition of the old and new forms a piquant contrast. The sentimentalist may, perhaps, sigh that this old city, rich as it is in dramatic memories, should become more noted for other than its history, but such seems to be its destiny, situated as it is in the midst of a district abounding with natural resources, and also so favorably with regard to railway and water transport facilities.

Strengthen Industry from Every Standpoint

220 King St. West, Toronto.

Editor, Electrical News,—

Your editorial of July 15th in regard to the need for a more centralized electrical association was read with interest. The writer had the pleasure of attending both the conventions referred to by you and felt, as I am sure all others attending both felt, that there were many of the matters discussed which were of common interest to both.

In fact, most of the subjects of papers and discussions were of mutual interest and it seemed that the confidential matters occupied a position of comparatively minor importance for the great majority of those attending the convention, although undoubtedly of vital interest to a small number of the members. One felt that it should not be difficult to treat the confidential matters of both associations in sub-sections of a larger society or to still continue to have meetings of the interested members of the association as at present on a much smaller scale, more in the nature of committee meetings. This would leave the convention free to take up the many questions of common interest to the members of both the present organizations.

It appeared that the differences in the views of the members of the two associations on certain matters were not nearly so marked as in previous years, and that if they met in a common convention to discuss and solve their many common problems, that they would be relegated to a position of minor importance.

I trust that your views may receive the serious consideration of the executives of the two associations referred to and that we may shortly see an amalgamation along the lines suggested, which should tend to strengthen the industry from every standpoint.

Yours very truly,

H. C. BARBER,

Standard Underground Cable Co.

The Canada Electric Co., Toronto, have secured the contract for electric wiring on an addition to be built to the Dufferin School at an estimated cost of \$120,000.

Current News and Notes

Alvinston, Ont.

The town of Alvinston, Ont., is installing an electric lighting system. Engineers of the Hydro-electric Commission of Ontario have charge of the installation.

Ashcroft, B.C.

The Ashcroft Water, Electric & Improvement Company suffered a loss of approximately \$10,000 recently when their power house and machinery were damaged by fire.

Collingwood, Ont.

The Public Utilities Commission of Collingwood, Ont., recently put on a successful electrical demonstration. The Commission propose opening a Hydro shop within a short time.

Estevan Point, B.C.

The site has been cleared for a wireless plant which the Dominion Government will erect at Estevan Point, B.C. The plant will be a 25 kilowatt station, with a normal radius of 2,000 miles.

Hamilton, Ont.

The Electric Supply Company, James St. South, has secured the contract for electrical work on a school building to be erected on Lottridge St. at an estimated cost of \$300,000.

Kingsville, Ont.

Messrs. Harris & Russell have recently opened an up-to-date electrical store on Division Street, Kingsville, where they will carry on the business of electrical contractor-dealers. The new firm have a full stock of fixtures and supplies and will undoubtedly do a thriving business, as theirs is the only electrical store in the town.

Long Branch, Ont.

Messrs. Harris & Marson, 81-A Parkway Drive, Toronto, have been awarded the contract for electric wiring on an addition being built to the public school at Long Branch, Ont., at an estimated cost of \$50,000.

Niagara Falls, Ont.

The Hydro-electric Power Commission of Ontario, which recently released some 3,000 employees engaged on the Chippawa Canal, has made a reduction of ten cents an hour in the wages of the men still at work there. The present rate of pay is 40 cents an hour.

Outremont, Que.

Mr. Loyd Sales, 274 Beaver Hill Avenue, Outremont, has been awarded the contract for electrical work on two residences on Courcellette Street costing approximately \$40,000.

Quebec, Que.

Messrs. P. P. Giguere Company, 56 Des Fosses Street, Quebec City, has secured the contract for electrical work on a Boys' School to be erected on St. Aimable Street, Quebec.

Regina, Sask.

The Sun Electric Co., Ltd., has secured the contract for electrical work on a school building being erected on the Lakeview Subdivision, Regina, at an approximate cost of \$110,000.

St. Catharines, Ont.

Clifford Electric Co., 19 Ontario Street, St. Catharines, has secured the contract for electrical work on a school building, costing approximately \$40,000, that is being erected on Niagara Street for the Separate School Board.

St. John, N.B.

Vaughan Electric Co., 94 Germain Street, have secured the

contract for electrical work on a school building to be erected on Elm Street at an estimated cost of \$175,000.

The Baird Electric Co., 129 Union Street, has been awarded the contract for electrical work on a school building to be erected on Newman Street at an estimated cost of \$125,000.

Sintaluta, Sask.

The citizens of the town of Sintaluta, Sask., recently voted favorably on a by-law authorizing an expenditure of \$8,000 for the installation of an electric lighting plant.

Toronto, Ont.

The Independent Electric Lamp Co., Ltd., has been formed with a capital of \$40,000, with head office at Toronto. The new firm will take over the business of the Independent Electric Lamp Co., 37 Yonge Street.

The Toronto Transportation Commission has awarded the contract for an addition to the Wychwood & Benton Avenue car barns, costing approximately \$220,000, to Jackson-Lewis Company, Ltd., general contractors, Ryrie Building, Toronto. An addition to the Danforth & Coxwell Avenue barns, costing in the neighborhood of \$300,000, goes to Wells & Gray Co.

Messrs. Richardson & Cross, 79 King Street East, have been awarded the contract for electrical work on an addition being built to the George Symes School on St. John's Road at a cost of approximately \$40,000.

The Ontario Gazette announces the incorporation of the National Fibre Company of Canada, Limited, with a capital of \$40,000, and head office at the city of Toronto. The new firm will carry on the business of manufacturers and dealers in all kinds of fibre, insulating materials and electrical specialties.

The following rate of wages, to be in force from September 1, 1921 (when the Commission takes over the street railway) to March 31, 1922, has been agreed to by the Transportation Commission and the present street railway company's employees: The present rates are 55c, 57½c and 60c per hour for all motormen, conductors, motor and truck repairers and similar employees. For the first three months the men get the first amount, for the next nine months the second, and the full rate after twelve months' service.

The Hudson Electric Co., 18 Toronto Street, has been awarded the contract for electric wiring on the office building of the Canada Permanent Mortgage Corporation, 14 Toronto St., which is undergoing alterations at an estimated cost of \$20,000.

The Devonshire Electric Co., 659 Yonge Street, have been awarded the contract for the electrical work on the Wychwood and Benton Avenues car barns addition by the Transportation Commission.

Welland, Ont.

Upper's Electric Shop, 28 Main St. E., has secured the contract for electrical work on the Recta Hotel, recently erected, together with a theatre, for Mr. S. L. Lambert at an approximate cost of \$200,000.

Winnipeg, Man.

The McDonald & Willson Lighting Co., 309 Fort Street, have been awarded the contract for electrical work on a Medical College being erected at Bannatyne and Emily Streets for the University of Manitoba. Also the contract for electrical work on a factory building being erected at Garry and McGinnis Streets for the W. F. Rawlough Co., Ltd. at an approximate cost of \$65,000.

To Executives and Managers of Public Utility and Hydro-Electric Companies

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WANTED—Someone to take charge of healthy boy 14 years of age who would like to learn the electrical trade. Address Box 635 Electrical News, Toronto. 16

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	75	3	25	550	480	Westg.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	60	550	970	Westg.
Used	2	50	3	25	550	720	Westg.
New	2	35	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	Tor & Hm
"	2	30	3	25	550	750	F.-M.
Used	1	25	3	25	550	750	C. G. E.
New	1	25	3	25	550	715	Lanc.
New	1	15	3	25	550	1450	Westg.
"	1	15	3	25	550	750	Lincoln
"	3	15	3	25	550	720	Westg.
New	2	13	3	25	550	700	Lanc.
Used	1	7½	3	25	220	1500	Tor & Hm
"	1	7½	3	25	550	1450	C. G. E.
New	1	7½	3	25	550	725	Westg.
Used	1	7½	3	25	550	700	Lanc.
New	1	5	3	25	550	1440	Excelsior
Used	1	5	3	60	200	1120	Westg.
New	3	3	3	25	550	1500	Lanc.
"	4	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
Used	1	2	1	60	110	1750	Wagner
New	2	2	3	25	550	1500	Lanc.
New	2	2	3	25	550	1440	Excelsior
"	2	2	3	25	550	1425	Lanc.
New	1	2	1	25	110	1400	Wagner
"	1	1½	1	25	110	1420	Wagner
New	1	1	1	60	110	1725	Wagner
Used	1	1	3	25	220	1500	Tor & Hm
Used	1	1	1	25	110	1460	Wagner
New	1	1	1	25	110	1440	Wagner
"	1	1	3	25	550	1425	Lanc.
Used	1	1	3	25	220	710	C. G. E.

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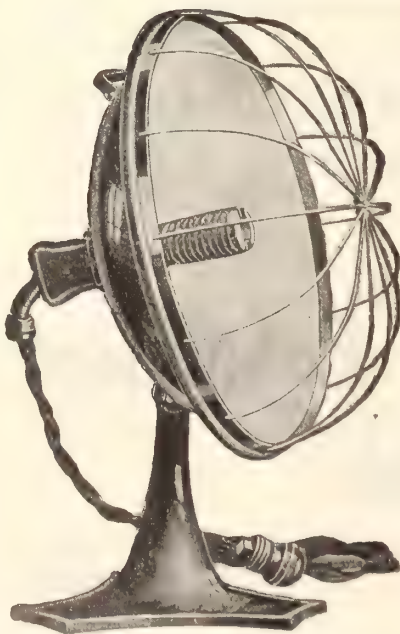
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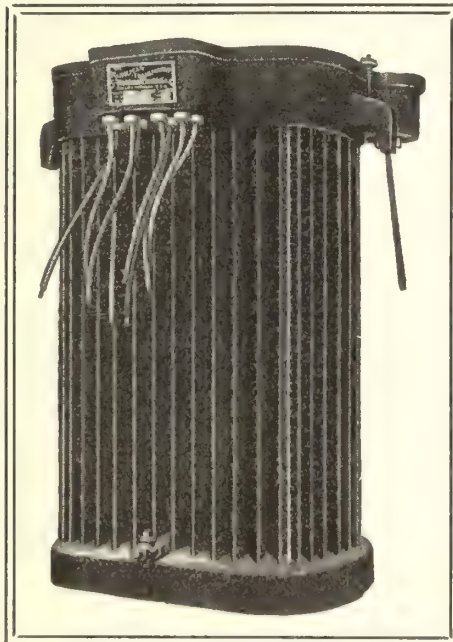
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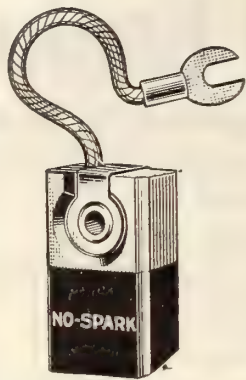
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This item can be cut to its lowest point right in the beginning by purchasing a machine with the electric motor attached—a Lincoln Electric Motor—scientifically fitted to its job by Lincoln Engineers.

Here are actual examples of the savings made by Canadian and U. S. machinery firms who are using Lincoln Motors.

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A manufacturer of a small electric hoist now gets 25% greater capacity on the same machine with no changes whatever in design—simply by installing Lincoln Motors of the size and type recommended by Lincoln Engineers.

Example No. 2—

The leader in another line of hoisting machinery has adopted a Lincoln plan for simplifying both the electric motor and its control on his machines so that his customers get better results at less than half the former cost.

Example No. 3—

The largest manufacturer of a certain type of metal working machine is now using a 20 h.p. Lincoln Motor where he formerly used a 25 h.p. of another make. Further, his customers are paying about 50% less in power bills for the running of their machines.

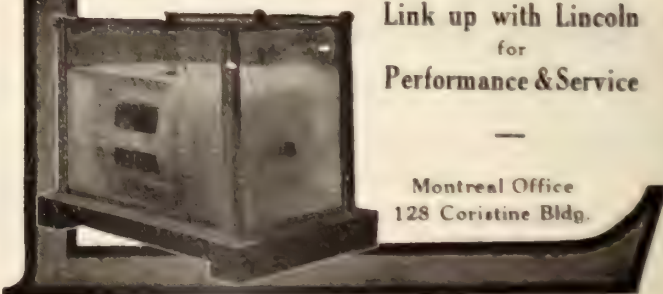
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Furnished complete with six feet of lamp cord and swivel plug in statuary bronze or brushed brass. (Vase not included.)

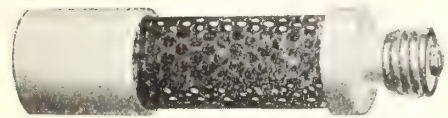
Adjustable chain pull sockets or cluster can be placed at any angle for flat or deep silk shades.

This new device for converting pottery jars or vases into beautiful electric lamps has proven its ability to sell.

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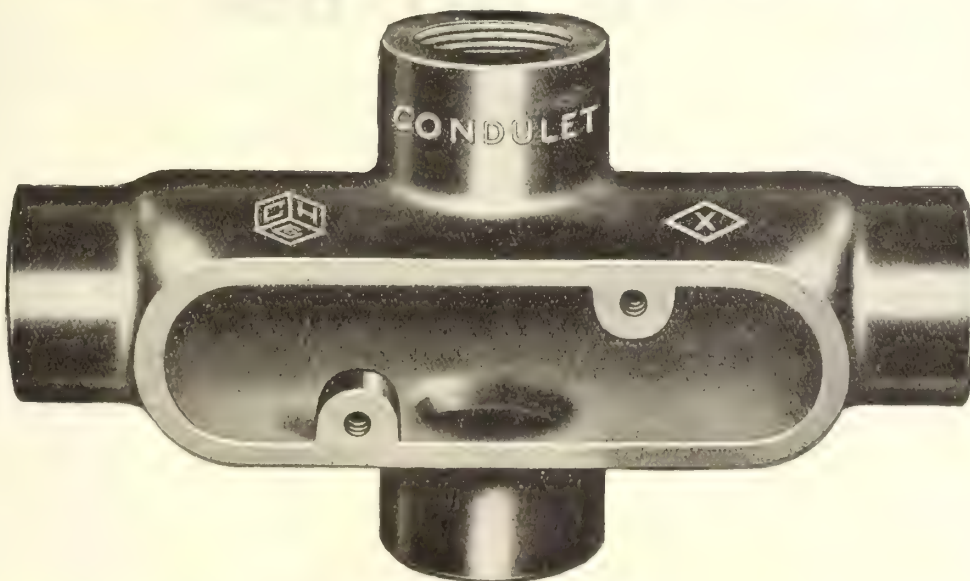
Ward Leonard Vitrohm (vitreous enamelled) resistor units save space, sockets, wiring—and original investment. The vitreous enamel insulation hermetically seals the resistance wire against possibility of change in value due to chemical, electrical or mechanical depreciation.

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Simplex Electric "Sunbowl" Radiator No. 99



This is a new and handsomely designed radiator combining in its construction the finest of materials and workmanship. It throws more heat than any other radiator of its type, because of the position and shape of the heating element, and also because of its unusually large reflector. May be attached to any lamp socket.

SPECIFICATIONS

Solid copper 14-inch dia. reflector.
Gun metal guard and handle.
Forest green finish.
8 ft. cord with detachable and lamp socket plug.
600 Watts.
Voltages—104-112, 113-120, 210-230.
Dimensions—20 in. high, Reflector 14 in. dia., Base 8 in. dia.
Shipping Weight 12 lbs.

The efficiency of any reflector type radiator depends upon the high polish of the reflecting surface. If this be made of steel, no matter how handsomely copper plated, it will soon discolor and rust through. Not only will it look badly, but its power to throw heat will be cut in two.

The Simplex "Sunbowl" reflector type is made of solid copper. Some day the reflectors on all radiators will be so made, but at present they are not.

A lock-on, quickly removable wire guard on the "Sunbowl" makes the reflector easy to keep clean. There are no welded joints to drop apart, every wire being firmly clamped in place. If accidentally tipped over, the radiator will always turn face upward, and throw its heat into the air, thereby avoiding the danger of scorching anything. Its distinctive forest green finish will harmonize with the color scheme of any room in the home or office. The inverted cone-shaped heating element is easy to renew or remove, screwing in like an electric bulb in a lamp socket.

Simplex Electric Heating Pad No. 685



The Simplex pad was the first Electric Heating Pad put on the market and for over a quarter of a century has been the standard by which all other pads have been judged.

SPECIFICATIONS

Type No. 685.
Voltages 100-125, 200-250.
Watts 50.
Three Heats.
Size 12 x 15 in.
Shipping Weight 3 lbs.

The Simplex pad is a light, soft, woolly eiderdown blanket, 15 inches long and 12 inches wide. It is the only means of providing a really effective Hot Application and one that maintains a constant, unvarying heat on the parts affected. The three heat feed through switch enables the pad to be kept as hot as wanted. The temperature of the pad is controlled by thermostats which prevent the pad from overheating.

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Light:—It gives no oppressive sense of weight.

Convenient:—Simply attach plug; no hot water to bother with.

Indispensible:—There is no worse predicament than to be without it when you need it away from home. It takes little space in the travelling case.

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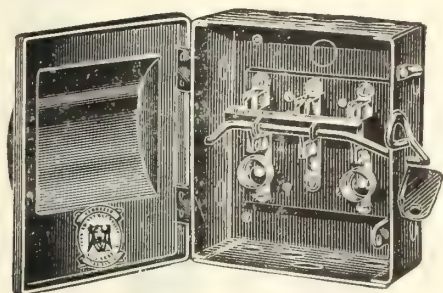
Eastern Representatives: SIMPLEX ELECTRIC HEATING COMPANY

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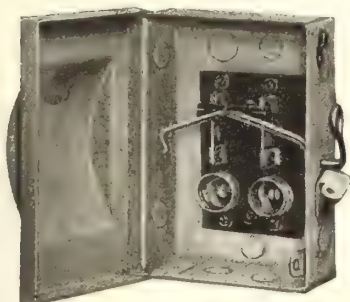
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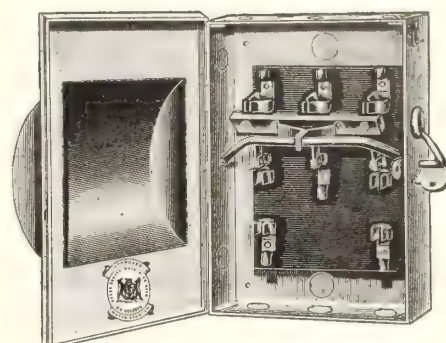
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 - 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
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- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 - 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 - 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
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 - 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
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 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
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 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE
- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 - 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
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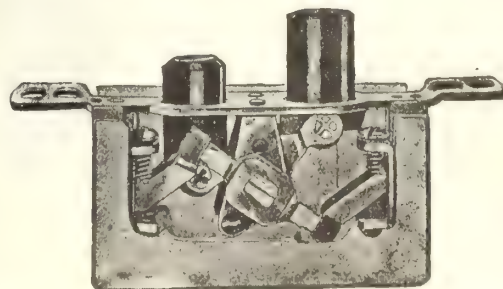
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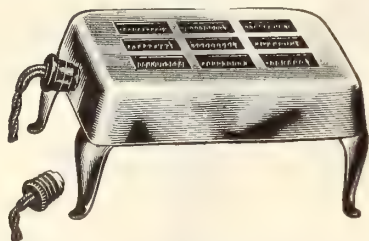
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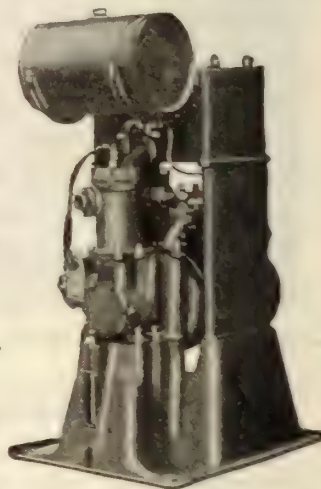
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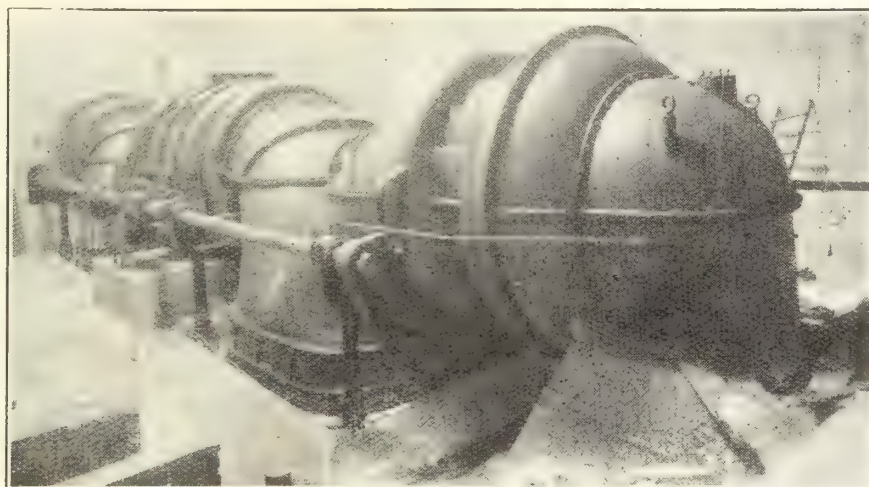
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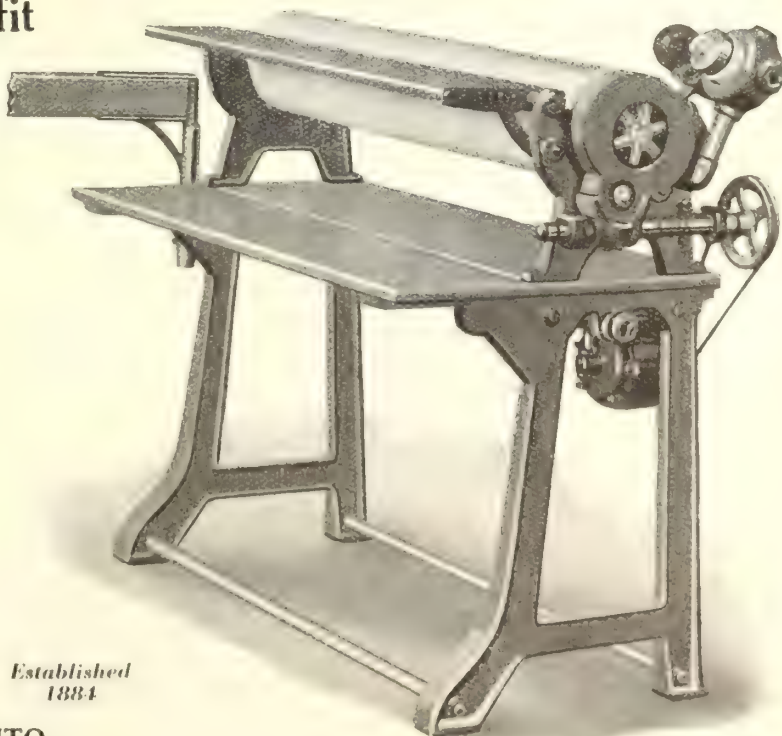
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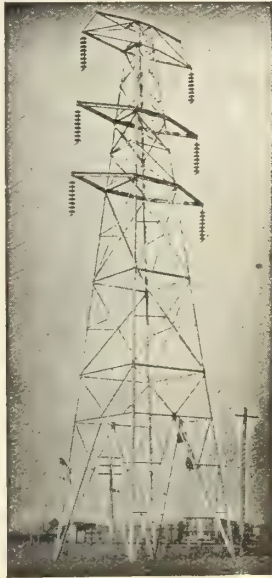
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the Lamp
MONOPOLY

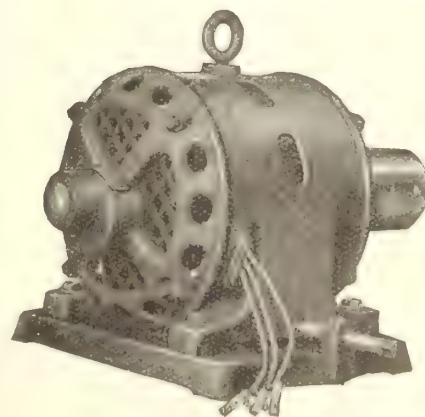
*On Sale at All Good Jobbing
Houses and Dealers*

Manufactured by

**THE SOLEX
CO., LIMITED**
MONTREAL
TORONTO WINNIPEG



Century Automatic Start Induction POLYPHASE MOTORS



Their high
starting torque
and low starting
current make
them particular-
ly desirable for
the operation of
compressors,
pumps, wood-
working, refriger-
ating, bottling,
laundry, shoe
repair machine-
ry, and brick
and tile machine-
ry, concrete mix-
ers, etc.

$\frac{1}{2}$ to 60 H.P.

Temperature rise not more than 40° Centigrade.

CENTURY ELECTRIC CO.

19th, Pine to Olive Sts. ST. LOUIS, Mo., U. S. A.

Stock carried in Canada by:

Jones & Moore Electric Co., Ltd., 291 Adelaide St. W., Toronto

Great West Electric Co., Ltd., Winnipeg

Rudel-Behm Machinery Co., Ltd., Canadian Express Bldg.,
Montreal

Rankin & Cherrill, 55 Hastings St. W., Vancouver, B.C.

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED**SPECIAL HEATING APPLIANCES**
National Electric Heating Company
Renfrew Electric Company**STORAGE BATTERIES**
Canadian General Electric Co., Ltd.
Canadian Hart Accumulator Company
Canadian National Carbon Company
Exide Batteries of Canada, Ltd.
Northern Electric Company**STREET LIGHTING FIXTURES**
Benjamin Electric Manufacturing Company
Canadian General Electric Co., Ltd.
Northern Electric Company
Winter Joyner, A. H.**SWITCHBOARD SLATE AND MARBLE**
Davis Slate & Manufacturing Company**SWITCHES**
Benjamin Electric Manufacturing Company
Canadian Drill & Electric Box Company
Canadian Johns-Manville Co.
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Devoe Electric Switch Company
Electrical Maintenance & Repairs Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto.
Moloney Electric Company of Canada
Northern Electric Company
Paulding, John I.**SWITCHBOARDS**
Canadian General Electric Co., Ltd.
Canadian Johns-Manville Co.
Canadian Westinghouse Company
Devoe Electric Switch Company
Ferranti Meter & Transformer Mfg. Co.
Moloney Electric Company
Monarch Electric Company
Northern Electric Company**SWITCH GEAR**
Ferranti Meter & Transformer Mfg. Co.
Monarch Electric Company**TAPE**
Canadian Johns-Manville Company
Packard Electric Company
Northern Electric Company**TELEPHONE EQUIPMENT AND SUPPLIES**Canadian General Electric Co., Ltd.
Century Telephone Construction Company
Northern Electric Company**TOASTERS**
Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Electrical Appliances, Ltd.
Equator Manufacturing Company
Hubbell Electric Products Co.
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company**TOOLS**
Northern Electric Company**TOY TRANSFORMERS**
Canadian General Electric Co., Ltd.
Killark Electric Manufacturing Company**TRANSFORMERS**
Canadian Crocker-Wheeler Company
Canadian Westinghouse Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
Kuhlman Electric Company
MacGovern & Company
Moloney Electric Company of Canada
Monarch Electric Company
Northern Electric Company
Packard Electric Company
Standard Transformer Company**TRANSMISSION TOWERS**
Canadian Bridge Company**TROLLEY GUARDS**
Ohio Brass Company**TUBING**
Northern Aluminum Company**TURBINES**
Canadian Westinghouse Company
Barber & Sons, Chas.
Boving Company of Canada
Canadian Allis-Chalmers Company
Hamilton Company, Wm.
MacGovern & Company
Smith Company, S. Morgan**UNDERGROUND INSTALLATIONS**Gest, Limited, G. M.
Northern Electric Company
Standard Underground Cable Co. of Canada, Ltd.**VACUUM CLEANERS**
Canadian General Electric Company
Franke Levasseur & Co.
Hoover Suction Sweeper Co. of Canada, Ltd.
McDonald & Willson, Ltd., Toronto
Northern Electric Company**VARNISHES**
Spielman Agencies, Registered**WASHING MACHINES**Altorf Bros
Benson-Wilcox Electric Co.
Canadian General Electric Co., Ltd.
Coffield Washer Co. of Canada, Ltd.
Henderson Business Machines Ltd.
Hurley Machine Company
McDonald & Willson
Meyer Bros.
Northern Electric Company
Slade Mfg. Co.**WATER WHEELS**
Smith Company, S. Morgan**WELDING EQUIPMENT**
Lincoln Electric Company of Canada**WIRE**
Boston Insulated Wire & Cable Company, Ltd.
Canada Wire & Cable Company
International Machinery & Supply Co.
McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited**WIRING DEVICES**
Canadian General Electric Co., Ltd.
Hatheway & Knott, Inc.
Northern Electric Company**WOOD SCREWS**
Robertson Mfg. Company, P. L.**WRINGERS (Power)**
BlueBird Corporation, Limited
Meyer Bros.

BAKELITE - DILECTO

For perfect insulation, use BAKELITE - DILECTO, a practically waterproof material of unlimited qualities.

BAKELITE - DILECTO has extraordinary dielectric and tensile strength, is chemically insoluble when brought in contact with water or weak acids, is harder and stronger than most woods and will neither swell nor warp.

BAKELITE - DILECTO is hard and tough yet can be readily machined.

BAKELITE - DILECTO may be used in many places instead of rubber, mica and many other materials for insulating purposes.

We manufacture BAKELITE - DILECTO, Vulcanized Fibre and Continental - Bakelite in sheets, rods, tubes and special shapes; and Conite, a thin insulation in sheets or rolls from .005 in. to .020 in. thick.



Full particulars about Continental Insulating Products should be on file in your office. We will be glad to send our catalogue on request.

THE CONTINENTAL FIBRE CO.

NEWARK, DEL.

New York Office:
233 Broadway

Chicago Office:
332 S. Michigan Ave.

Pittsburgh Office:
301 Fifth Avenue

San Francisco Office:
528 Market Street

Los Angeles Office 411 S. Main Street

Secondhand Motors

We do not manufacture motors, but have for disposition the D.C. Motors mentioned below at very low prices:

H.P.	R.P.M.	Volts	K.W.	Maker
50	550	500	..	Westinghouse
50	825	500	..	Westinghouse
25	925	500	18	Consolidated
15	1200	500	11 $\frac{3}{4}$	Consolidated
12	1300	500	9	Consolidated
35	....	500	25	Consolidated
16	1275	500	12	Consolidated
7	1500	500	6	Consolidated

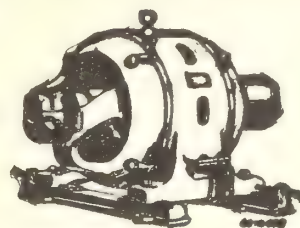
Get in touch with us at once.

J. & J. Taylor, Limited

145 Front Street East

-

TORONTO



Motors Generators Transformers

Whether you want a single, a two or a three phase or a D.C. motor of any size, it can be found in our stock.

Here you will find new and re-built Motors, Generators and Transformers offered for sale or exchange from the largest stock of its kind in Canada.

You will make no mistake when you let us fill your Electrical Power Apparatus requirements. Our guarantee protects you. Our policy has always been low prices and a square deal to all.

Wire, 'phone or write us for particulars.

Electric Motor & Machinery Company, Limited

64 Wellington St.,
Toronto, Ont.

417 St. James St.,
Montreal, Que.

CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

*Manufacturers of High and Low
Tension Porcelain Insulators*

VERMONT ELECTRICAL SLATE

FOR SWITCHBOARDS,
PANELBOARDS, LIN-
ERS, ETC., IN PLAIN
AND MARINE BLACK
FINISH.

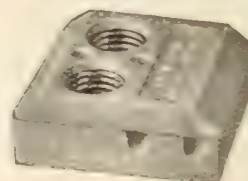
*Get in touch with
us for prices and
full information.*

HYDEVILLE SLATE WORKS
HYDEVILLE, VERMONT, U. S. A.

COVERED CUTOUTS

ALL PORCELAIN

No. 61936
D. Pole
Single
Branch



No. 62588
D. Pole
Double
Branch

MANUFACTURERS
DUNCAN ELECTRICAL CO. Ltd.
MONTREAL, - CANADA

Maritime Representative :
F. M. WHELPLEY, Halifax.

Ontario Representative :
WM. F. KELLY, Toronto

Western Representatives :
COCHRANE STEPHENSON & CO., Limited, Winnipeg.

Nine Reasons for Using the Robertson Patent Screw

FIRST—It is driven with about half the exertion required in driving the ordinary slot-headed screw, all the power used is concentrated in turning the screw.

SECOND—It does not require to be started with a hammer, and may be started and driven with one hand.

THIRD—It is impossible for the driver to slip out of the socket and cut the finger or disfigure costly furniture or woodwork.

FOURTH—The screw cannot wobble, as it is held fast in a line with the driver, and consequently goes in true and straight.

FIFTH—The screw lasts longer, as there is no wear on the head, this part will last as long as the body of the screw, which is practically indestructible.



SIXTH—Practically adapted for long screw driver and difficult work, and can be driven in overhead work as readily as on the bench.

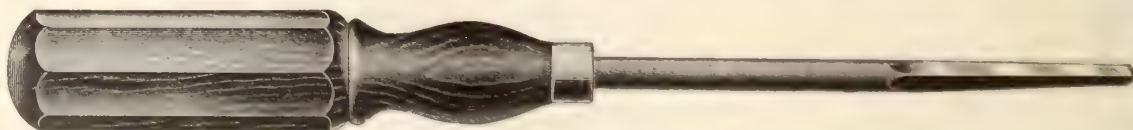
SEVENTH—For overhead work—electric wiring, or work in difficult places, it practically cuts the work in two, and eliminates all danger of the driver slipping and coming in contact with live wires.

EIGHTH—It can be driven at any angle, because the screw fits the driver and becomes, as it were, one solid piece with the driver.

NINTH—It removes entirely the possibility of ragged looking heads, which are not only unsightly, but cut the hands and destroy the clothing.

The P. L. Robertson Mfg. Co., Ltd., Milton, Ont.

One of the
drivers
supplied
--FREE--

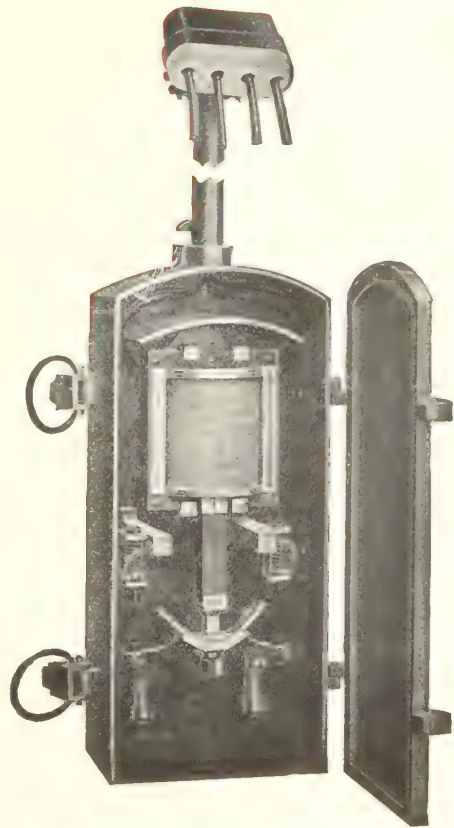


Greater Efficiency and Less Expense

Install the

SOLENOID SWITCH

The Solenoid Switch has been adopted by the Hydro Electric Commission for use in its street lighting systems.



THAT the Solenoid Switch was chosen for this work is adequate proof of the superiority it possesses. Comparative tests were made and the Solenoid switch chosen for its greater efficiency, freedom from repair trouble and low cost of installation. To-day these switches are doing faithful work in the public service in many towns throughout Ontario and Quebec.

The Solenoid Switch has no springs, swivels or delicate mechanism of any kind to get out of order. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons. Our type 17 H. E. P. Solenoid Switch is suitable for any frequency on multiple circuit or D.C. Series Circuit.

We will gladly furnish particulars to interested parties.

The ELECTRICAL MAINTAINCE & REPAIRS Co., Ltd.

162 ADELAIDE STREET., WEST, TORONTO

"Always on the job"

ELECTRICS LIMITED

Seigneurs and William Streets
MONTREAL

Industrial Lighting
Street Lighting
Insulating Material

Westinghouse Fans
Heating Appliances
Transformers

Motors, new & used
Meters
Safety Switches

General Electrical Supplies

The Booth-Coulter Copper & Brass Co., Ltd.

"The Copper and Brass People"

COPPER BUS BARS

SIZES IN STOCK—IN INCHES

1/16 x 1	1/8 x 1	3/16 x 1 1/2	1/4 x 1 1/2
1/16 x 1 1/2	1/8 x 1 1/2	3/16 x 2	1/4 x 2
1/16 x 1	1/8 x 2	3/16 x 3	1/4 x 2 1/2
1/16 x 1 1/2	1/8 x 4	1/4 x 1 1/2	1/4 x 3
1/16 x 2	3/16 x 3/4	1/4 x 1 1/2	1/4 x 4
1/8 x 1 1/2	3/16 x 1	1/4 x 1	1/4 x 5
1/8 x 1 1/2	3/16 x 1 1/4	1/4 x 1 1/4	

Copper and Brass Sheets, Tubes and Rods

Our assortment is large and we can give you prompt service. Let us quote you.

ALSO AT YOUR SERVICE

A complete metal working plant—all under one roof.

Coppersmiths, Brass Founders and Finishers, Fire Extinguishers, Metal Spinners, Automatic and Screw Machine Work, Copper Floats, Special Sheet Metal Work, Polishing and Electro Plating, Metal Stamping.

THE BOOTH-COULTER COPPER & BRASS CO., LTD.

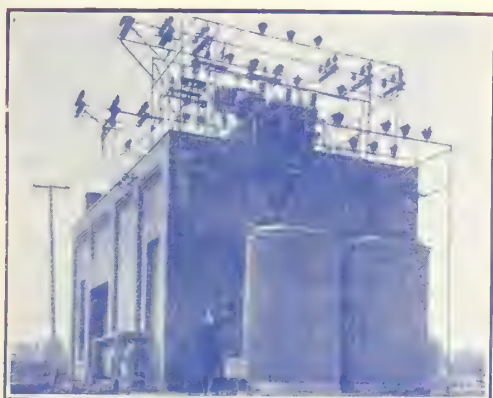
115-121 SUMACH STREET

TORONTO

Electrical

News

Engineering Contracting Merchandising Transportation



Many such installations as this may be seen throughout Canada—all giving the splendid service for which Moloney Transformers have become famous.

Transformers

Moloney High Efficiency Type

The transformer to choose for your next installation is one that has made good—Moloney high efficiency transformers are of that type.

They give uninterrupted service over long periods of time because they are correct as to design and the workmanship and materials entering into them are first-class.

FOR FURTHER DETAILS APPLY



3 Phase
POWER TRANSFORMER

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.

District Offices

Factory

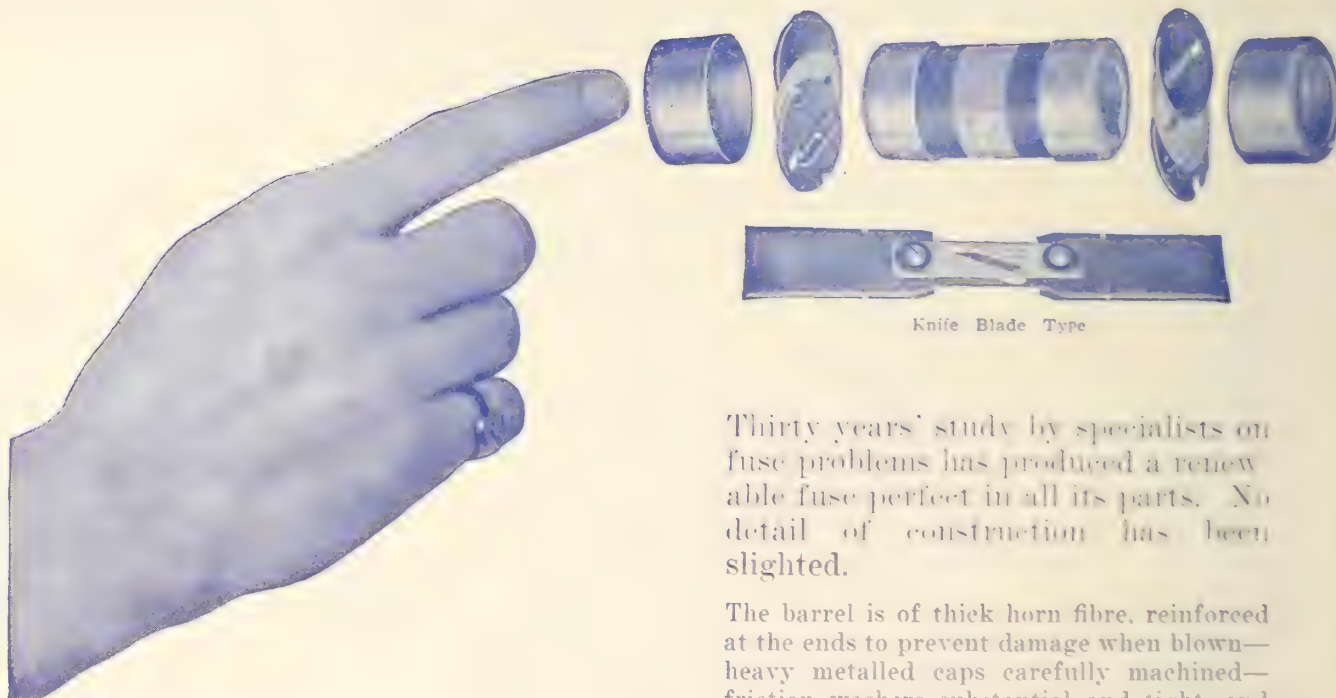
Head Sales Office

Montreal and Halifax

Windsor, Ont.

1221-2 Bank of Hamilton Bldg. Toronto

Northern Electric Shawmut Renewable Fuses



Approved by the Board of
Fire Underwriters and the
Hydro-Electric Power Com-
mission of Ontario.

Thirty years' study by specialists on
fuse problems has produced a renew-
able fuse perfect in all its parts. No
detail of construction has been
slighted.

The barrel is of thick horn fibre, reinforced
at the ends to prevent damage when blown—
heavy metal caps carefully machined—
friction washers substantial and tight, and
all threads metal to metal. Copper current
carrying parts—ampere capacity stamped
plainly on ferrule—black tubing: all features
making for absolute dependability and con-
venience.

No tools are needed to renew the ferrule
type fuse; for the knife blade type, only a
screw driver.

In stock at all our houses

Northern Electric Company LIMITED

Montreal

Quebec

Toronto

London

Regina

Edmonton

Halifax

Ottawa

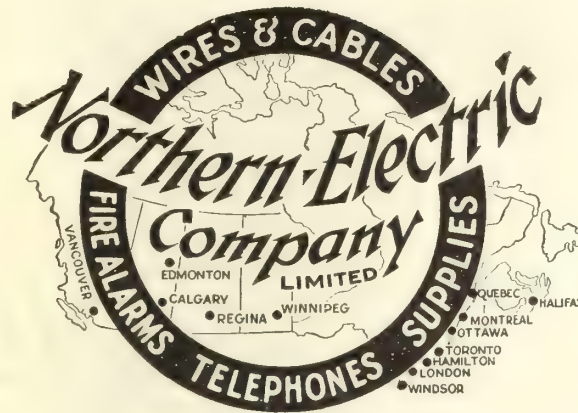
Hamilton

Windsor

Winnipeg

Calgary

Vancouver



Enamelled Wire

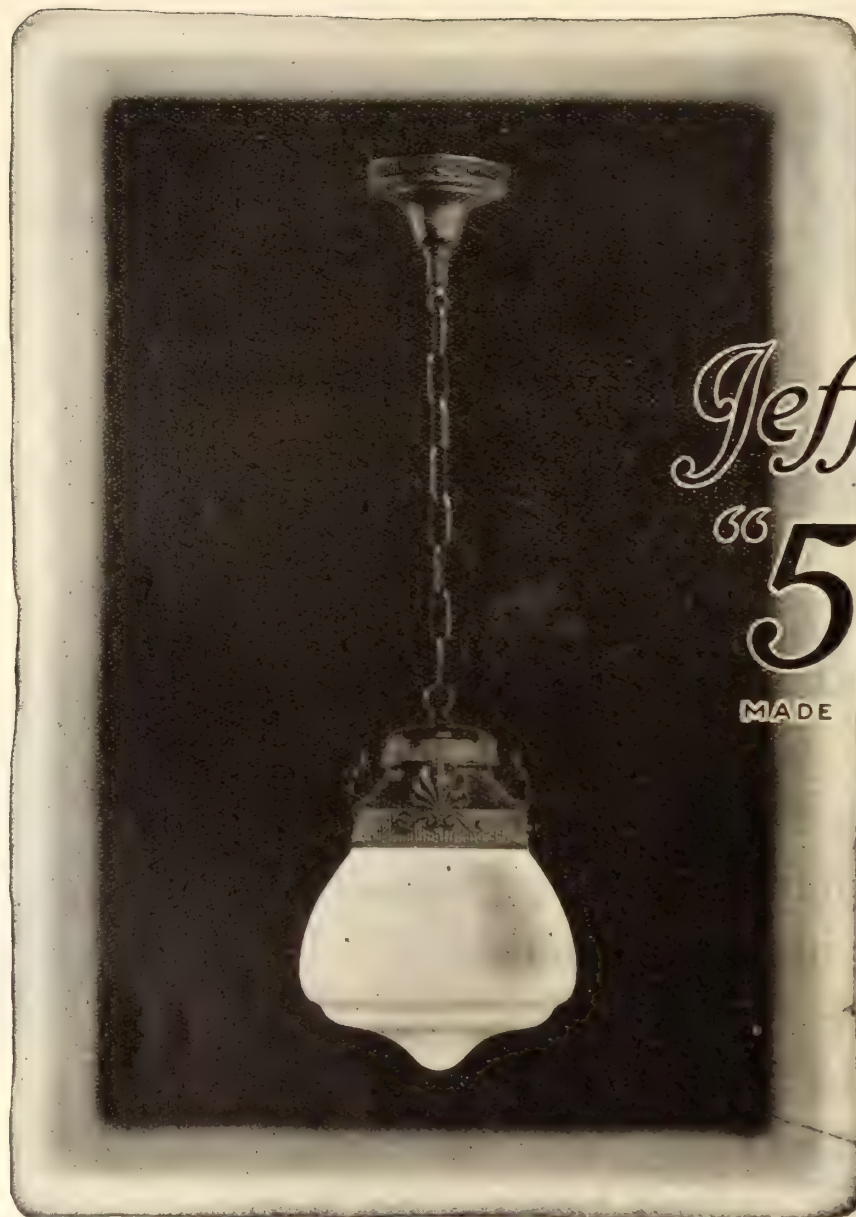
The Northern Electric Company
is now manufacturing Enamelled Wire
entirely in its own plant.

Plain Enamelled Wire
Cotton Covered Enamelled Wire
Silk Covered Enamelled Wire

Your enquiries are solicited.

Northern Electric Company
LIMITED

Montreal Quebec Toronto London Regina Edmonton
Halifax Ottawa Hamilton Windsor Winnipeg Calgary Vancouver



Jefferson

⁶⁶**515**[”]

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A PLEASING DEVIATION FROM THE BALL GLOBE

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo Glass, with standard 6 inch fitter. Adaptable for any business lighting.

GET ON THE "515" AND CREATE NEW BUSINESS

Ask for our New Booklet of Commercial Lighting Units

THE JEFFERSON GLASS COMPANY, LIMITED

Head Office and Factory: 388 Carlaw Avenue, Toronto

Showrooms: 164 Bay Street, Toronto
272 Main Street, Winnipeg

285 Beaver Hall Hill, Montreal
510 Hastings Street W., Vancouver

Why "Noark" Fuse protection is dependable insurance

The best made fuse— "Noark"

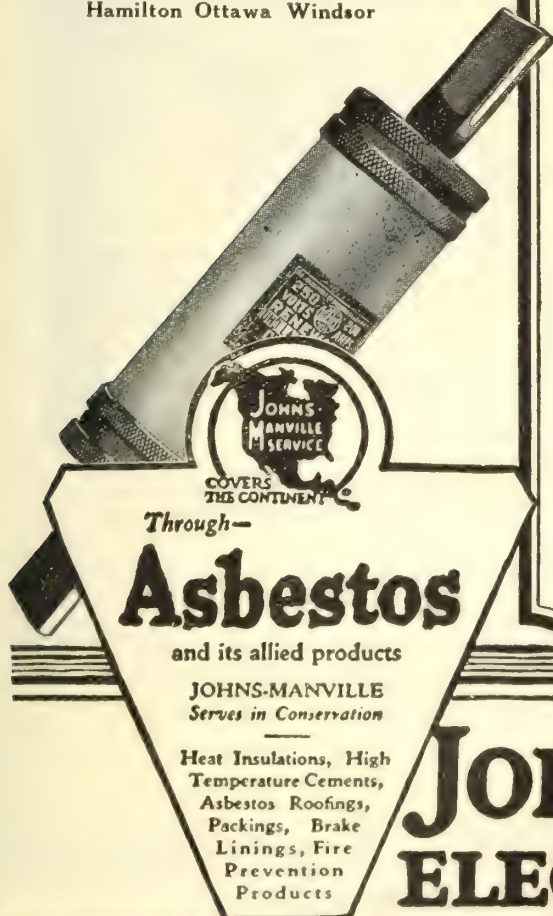
THE reliability of a "Noark" Fuse is never a doubtful matter. Throughout the entire process of its manufacture every precaution is taken to insure reliability and in addition these precautions are backed up by many actual tests of every fuse before it leaves the factory.

The name, "Noark," on a fuse is too valuable to risk on anything but the best. So, when overload or short circuit occurs, you know a "Noark" Fuse will open the circuit promptly, quietly and safely.

"Noark" Renewable and Non-Renewable Cartridge Enclosed Fuses, in all standard capacities, are approved by Underwriters' Laboratories, Inc., under the Label Service.

Canadian Johns-Manville Co., Ltd.

Toronto Montreal Winnipeg Vancouver
Hamilton Ottawa Windsor



*Buy Johns-Manville Electrical Materials from
the ample stock of any one of these distributors*

Distributors

<i>Alabama</i> Moore-Handley Hardware Co., Birmingham	<i>New York</i> Electric Supply and Equipment Co., Albany McCarthy Bros. & Ford, Buffalo Manhattan Electric Supply Co., Inc., N.Y.C. Roberts, H.C., Electric Supply Co., Syracuse Royal Eastern Electrical Supply Co., N.Y.C. Utica Electrical Appliance Co., Utica
<i>California</i> Gilson Electric Supply Co., Oakland Listenwaller & Gough Co., Los Angeles	<i>Ohio</i> F. Bissell Company, Toledo The Erner Electric Co., Cleveland Post Glover Electric Co., Cincinnati
<i>Colorado</i> Mine & Smelter Supply Co., Denver	<i>Oregon</i> North Coast Electric Co., Portland
<i>Connecticut</i> Electric Supply & Equipment Co., Hartford Hessel & Hoppen Co., New Haven New England Engineering Co., Waterbury	<i>Pennsylvania</i> Electric Supply and Equipment Company, Reading Electric Supply and Equipment Company, Scranton Franklin Electric Co., Philadelphia The Iron City Electric Co., Pittsburgh Novelty Electric Co., Philadelphia Star Electric Co., Erie Woodring & Co., Jere, Hazleton
<i>Illinois</i> Monarch Electric & Wire Co., Chicago	<i>South Carolina</i> Perry-Mann Electric Co., Inc., Columbia
<i>Indiana</i> National Mill Supply Co., Fort Wayne Varney Electric Supply Co., Indianapolis	<i>Tennessee</i> Electric Supply Co., Memphis
<i>Iowa</i> Andrae, Julius and Sons Co., Mason City Iowa Electrical Supply Co., Des Moines	<i>Texas</i> Electric Appliance Company, Dallas Mine & Smelter Supply Co., El Paso
<i>Kentucky</i> Republic Electric Co., Davenport	<i>Utah</i> Mine & Smelter Supply Co., Salt Lake City
<i>Louisiana</i> Peaslee-Gaulbert Co., Louisville	<i>Virginia</i> Woodhouse Electric Co., Inc., Norfolk
<i>Massachusetts</i> Gulf States Electric Company, Inc., New Orleans	<i>Washington</i> North Coast Electric Co., Seattle The Washington Electric Supply Co., Spokane
<i>Michigan</i> Buckminster, Geo. H. Co., Boston Wahn, Geo. H. Co., Boston	<i>West Virginia</i> Fairmont Mining Machinery Co., Fairmont
<i>Minnesota</i> Electrical Warehouse Inc., Detroit	<i>Wisconsin</i> Andrae, Julius & Sons Co., Milwaukee
<i>Missouri</i> Andrae, Julius & Sons Co., Duluth	<i>B. C., Canada</i> Horsman, E. B. & Sons, Vancouver
<i>Montana</i> Commercial Electrical Supply Co., St. Louis Funston Electric Co., Kansas City	
<i>New Jersey</i> Montana Electric Co., Butte Montana Electric Co., Great Falls	
<i>New York</i> Newark Electrical Supply Co., Newark	

"Noark" Fuses and all other Johns-Manville packaged Electrical Materials are distributed strictly through distributor-dealer channels on a basis that gives full protection to all concerned. Dealers can get all details from their Distributor. Distributors, for samples and complete information, should apply to the Electrical Department of the nearest Johns-Manville Branch.

JOHNS-MANVILLE ELECTRICAL MATERIALS

—WANTED—

A Position--at 10c per Day

I am the Henderson Business Service. I come to your desk in the form of a leather-covered indexed, loose-leaf Price Book, containing suggested Selling Prices on every standard article used in your business from a Socket Bushing to a 1200 Ampere Service Box. I stay for one year (or longer if you want me). Whenever Cost Prices change, I am supplied from our Office in Brantford, with revised sheets, so that I am always up to date—never sleep—need no holidays—cause you no delay or inconvenience, and it costs you only 10c. a day to keep me.

WHY YOU SHOULD HIRE ME

1. I will see that you receive a reasonable profit on every article leaving your shop.
2. No matter how unsettled the market is, I will always keep you informed of the correct Selling Price.
3. It will not be necessary for you to search through invoices and catalogues—you need not be bothered with taking off discounts and adding percentages. I do all this for you in a few seconds.
4. I will gain your customers' confidence by eliminating guesswork and thus permit you to charge up a job or sell an article without delay. If a customer complains of the prices charged, I am there in black and white to prove that you are using the recognized Standard List now in use all over Canada.
5. It is not necessary for you to stay around the Office and handle each detail yourself. With me, your stenographer, bookkeeper or apprentice can charge up your job work or sell materials over the counter without your assistance.
6. I will guarantee to produce better prices for your jobbing work without losing any of your customers. For instance: If your volume of jobbing business is \$15,000, I will at least add 4 or 5% to your prices without your customers raising any serious objections. Here alone, is Six or Seven Hundred Dollars added to your profits, and mind, I will do this for 10c. a day.
7. Instead of causing you to lose business, I will actually help you procure more, because your prices will be kept adjusted according to changing conditions. You will, therefore, not be selling too cheap—nor will you be asking old war-time prices.
8. By keeping me in your Office, you are helping to establish a set of Standard Retail Prices for Electrical goods throughout this country, thereby improving the business as a whole.
9. I do not insist on you maintaining the prices I give you, but simply advise the price you should get in order to make a reasonable profit.
10. I am worth more than 10c. a day to you if you use me only as a check and a guide. I know, however, from experience, that I will save two or three times this amount for you each day. In fact, if your business amounts to only \$100 a week, I will at least pay my keep 10 times over.

ASK FOR AN ORDER BLANK

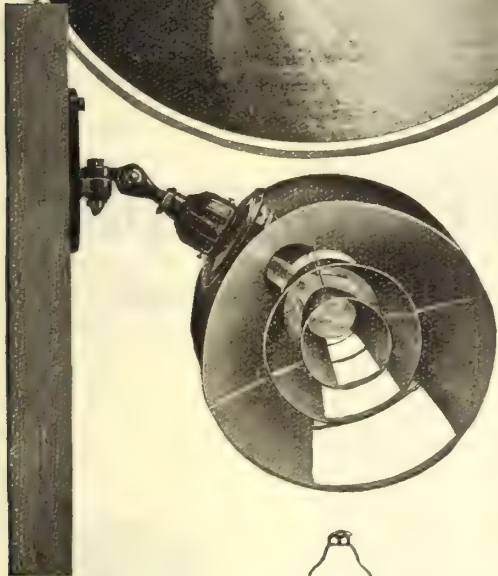
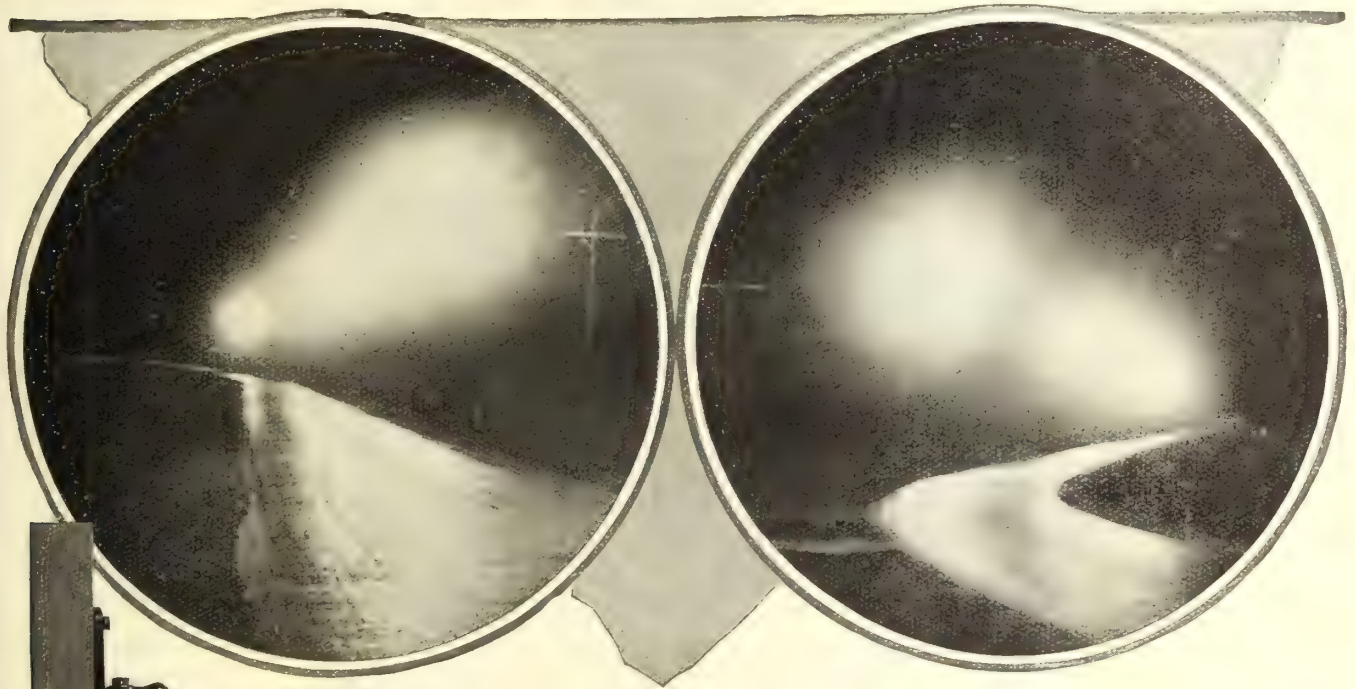
The Henderson Business Service, Limited

BOX 123

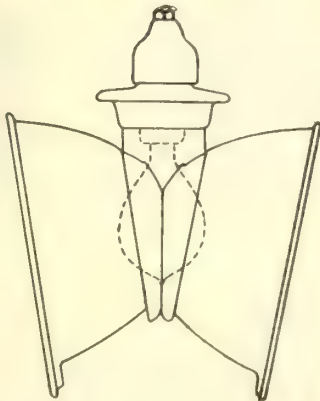
BRANTFORD

CANADA

Improvements that aid transportation help to solve one of the leading problems that are engaging the attention of the country today.



This fixture with three nested reflectors is the secret of good highway lighting.



Highway Lighting

GOOD Provincial Highways and County Roads are to-day broadly accepted by Canadians as economic necessities.

Proper lighting of these roadways is essential for the safety and convenience of the motorist and for the protection of pedestrians, bicycle riders or horse-drawn vehicles.

With the Canadian General Electric Company's new system of highway lighting, using fixtures that spread all the light on the road, a comparatively slight expense will eliminate the danger from night driving and will increase the commercial utility of our Canadian Good Roads System.

One 250 C.P. lamp every 400 to 600 feet, mounted on existing telephone or telegraph poles, will provide adequate illumination without glare.

Though this system can be wired for multiple lamps, a series system is generally more economical and is especially adapted to automatic time switch control.

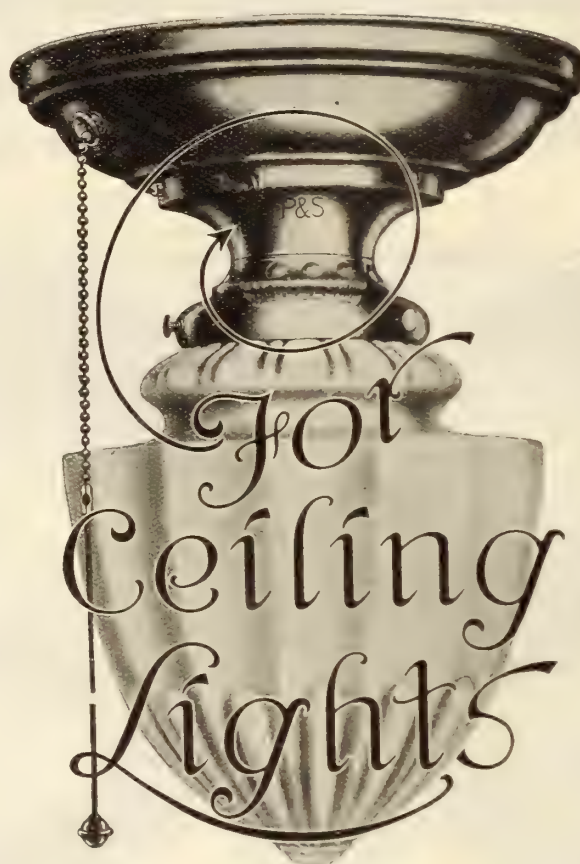
Our engineering experience in Street Lighting problems is at your disposal.

Canadian General Electric Co., Limited

HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

*The Arrow
Points at the
Receptacle*



*For
Ceiling
Lights*

*Send for a
Sample of
P&S 998
Now*

Let us send you a free Sample
because these Receptacles are selling at this time

Fixture Men and Electrical Contractors
are Buying P&S 998 and 427



P&S 998

Easy to buy
Quick to use
For Quick Sales

Make a Snappy Bed-room Light
with 998 or 427



P&S 427

Only a few folders left—

Write today for Ceiling Light Folder

PASS & SEYMOUR, Inc.
SOLVAY NEW YORK

GALVADUCT and LORICATED

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

**Always specify
Galvaduct or
Loricated
CONDUITS**



The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

**Always specify
Galvaduct or
Loricated
CONDUITS**

**"A Galvaduct Building"
United Typewriter Building, Toronto**

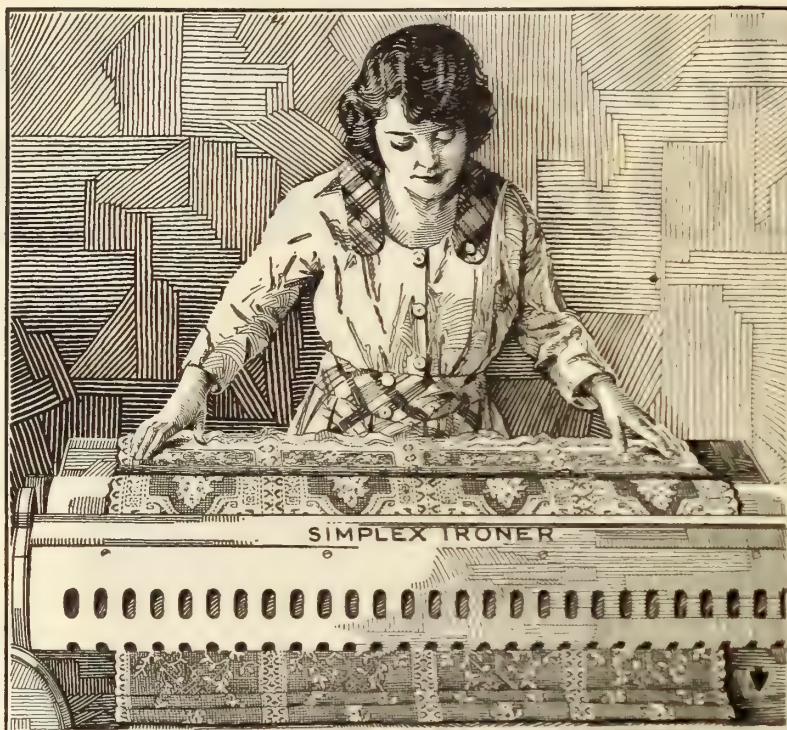
CONDUITS COMPANY

LIMITED

Toronto

Montreal

Western Sales Office: 602 Avenue Building, Winnipeg



Saleability

There can be no doubt about the selling possibilities contained in these "Simplex" Ironers.

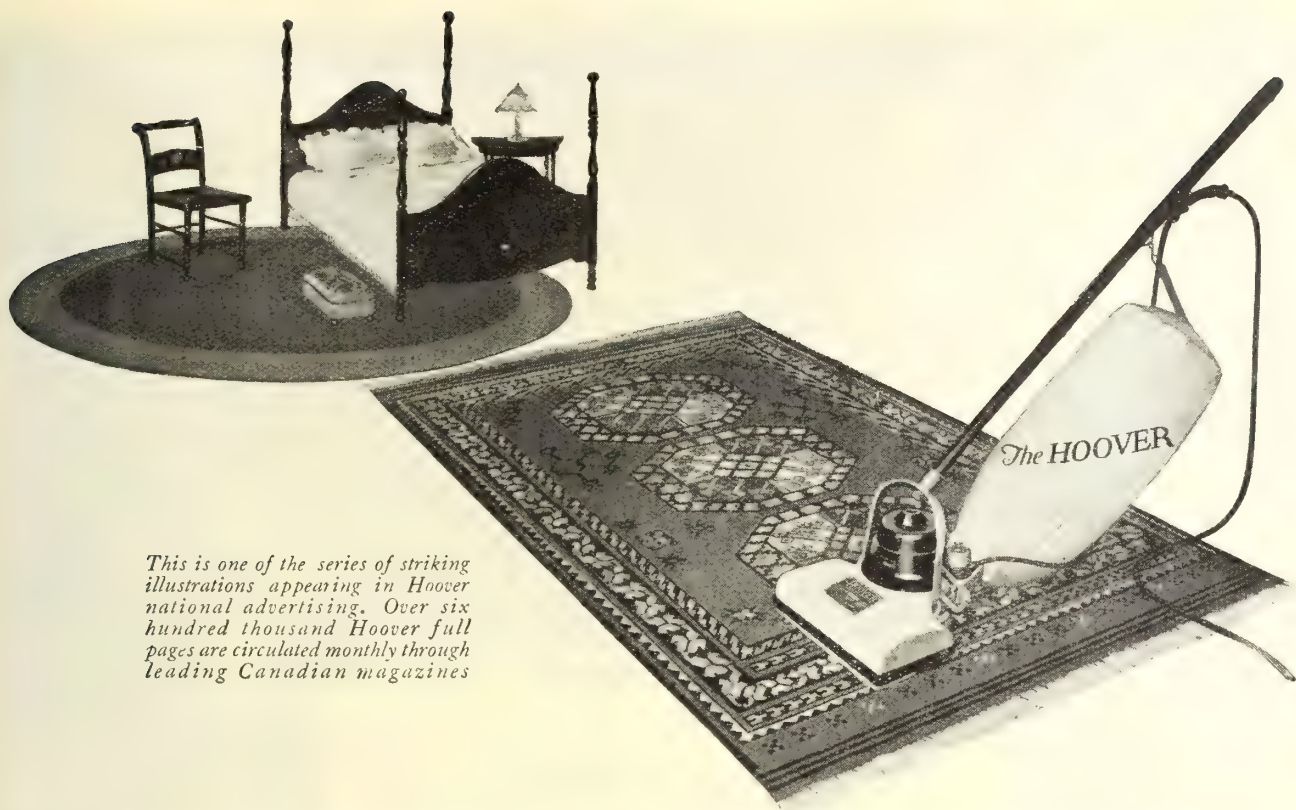
Their splendid construction and high-grade materials insure a long service. And this, together with the fact that they fill a real need, quickly wins over the busy housewife. In addition we render every possible help to the dealer in the way of window cards, folders and newspaper cuts.

It is an opportunity no electrical merchant should overlook. Write and let us send you full particulars. Prices will appeal to dealer and consumer.

Canadian Ironing Machine Co., Limited
Woodstock Ontario

SIMPLEX IRONER

"THE BEST IRONER"



This is one of the series of striking illustrations appearing in Hoover national advertising. Over six hundred thousand Hoover full pages are circulated monthly through leading Canadian magazines

Twenty to Twenty-four Turnovers a Year, with Sales as Large as in 1920—on the Hoover Resale Plan

Working in friendly rivalry with five other dealers who are also busy selling Hoovers in the same city, the Robert Simpson Company, Limited, of Toronto, during the first seven months of this year, sold 271 Hoovers valued at \$19,025.

Last year this large department store sold 499 Hoovers, total value, \$32,550, while in 1919 the Hoover volume was \$9,375.

Operating on the famous Hoover Resale Plan, this store has for the past twenty months been turning over its stock of Hoovers at the rate of from 20 to 24 times a year. Knowing that turnover to a large extent determines profit, we encourage rapid turnover with all Hoover dealers by maintaining a steady flow of shipments to keep pace with current sales.

At the Robert Simpson store, Hoover demonstration tables are maintained on both the main floor and in the carpet department. Hoover

window displays are installed at least monthly. One or two Hoover advertisements are used weekly in the store's newspaper announcements.

As is usual with dealers who heartily co-operate with us, the Robert Simpson Company is *thoroughly satisfied* with the business being secured on Hoovers. In the past they tried selling other cleaners, but experience has shown them that The Hoover is the easiest to sell and that it gives lasting satisfaction to its purchasers.

The Resale Plan is also open to other dealers. It is an arrangement whereby we procure the leads, demonstrate, sell and service Hoovers as a part of the dealer's organization.

Are you ready to consider The Hoover and the Hoover Resale Plan? Now, during fall housecleaning time and prior to Christmas, is a most favorable season to start.

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and General Offices: Hamilton, Ontario

The HOOVER

It Beats... as it Sweeps as it Cleans
MADE IN CANADA—BY CANADIANS—FOR CANADIANS



**BAKELITE
DILECTO**

A PERFECT INSULATION

Bakelite-Dilecto satisfactorily replaces rubber, mica, and other materials for insulation purposes or mechanical applications. It is hard and tough, readily machined and neither warps nor swells. It is manufactured in sheets, rods, tubes and special shapes. We also manufacture Vulcanized Fibre and Continental-Bakelite in sheets, rods, tubes and special shapes, and Conite in sheets or rolls from .005" to .020" thick. Write for prices.

Canadian Agents—Henry Engineering Company,
89 Wellington St. W., Toronto

The Continental Fibre Co., Newark, Delaware

Pittsburgh Office	New York Office	Chicago Office
301 Fifth Ave.	233 Broadway	332 S. Michigan Ave
San Francisco Office, 525 Market St.; Los Angeles Office, 411 S. Main St.		

Monarch Outdoor Switching Equipment



Central Stations can now obtain completely Canadian-Made Equipment for Switching and Line protection.

Monarch Apparatus for this service is designed in the light of the widest operating experience of the largest power companies in Canada.

Workmanship in Monarch Switching Equipment is designed to withstand the severe climatic conditions very often encountered.

Monarch Outdoor Switching Apparatus is in use on the largest Canadian Systems. Let us quote you on your next requirements for this service.

Monarch Electric Company, Ltd.

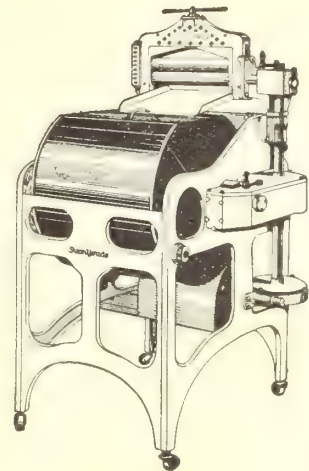
St. Lambert

District of Montreal

Sunnysuds

Electric Washer & Wringer

*A remarkable Washer
at a remarkable price*



Goodbye Wash Board, Hello Sunnysuds!

Some of the reasons why you should handle the SUNNY-SUDS Washing Machine in your district,

FRAME

Pressed steel flanged to give more strength, no bare metal parts to rust. White Enamel finish.

CASTERS

Pivot bearing.

MOTOR

One quarter horse power Domestic Motor. Self cooling splash proof type.

TUB

Six sheet size, corrugated, seamed and soldered solid copper, therefore rust proof.

WRINGER

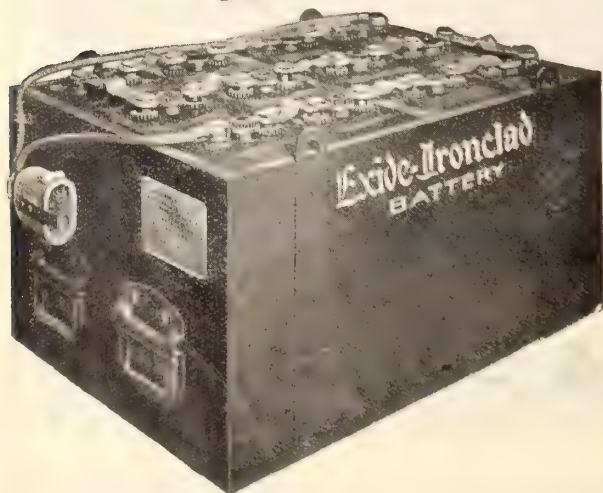
Solid aluminum; swings in four positions.

Large stock always on hand. Wire for sample or leaflets to—

FRANKE, LEVASSEUR & CO., LIMITED
150 CRAIG ST. WEST MONTREAL.

Exide

MADE IN CANADA
BATTERIES



What Is It Costing You to Move Materials?

If you are trying to keep "ahead of the game" with hand-trucks, the work is costing you more than it should—in man-power and in money.

The average industrial truck will pay for itself in less than a year—provided it is equipped with the right battery.

Rugged, powerful and unfailing, the Exide-Ironclad Battery will deliver, day in, day out, the power to haul heavy loads with the minimum cost and care.

Whether your problem is to move materials, operate railway signals, remote control switches, or provide a source of power for emergency use—there is an Exide for the purpose.

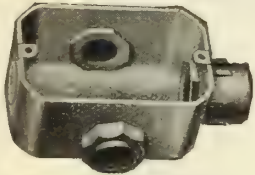
EXIDE BATTERIES OF CANADA, Limited
153 Dufferin Street,
TORONTO

Exide Batteries are made in Canada, in England and in the United States. Into every Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

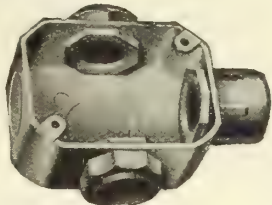
Wirelets



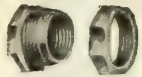
Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body

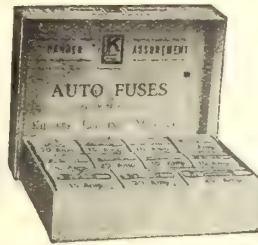


Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
3/4" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

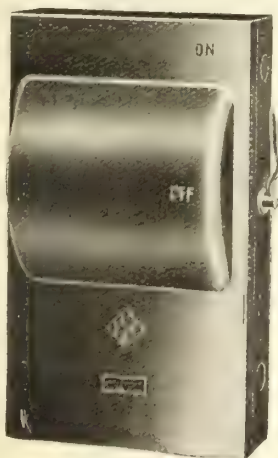
HATHEWAY & KNOTT

Electrical Merchandise

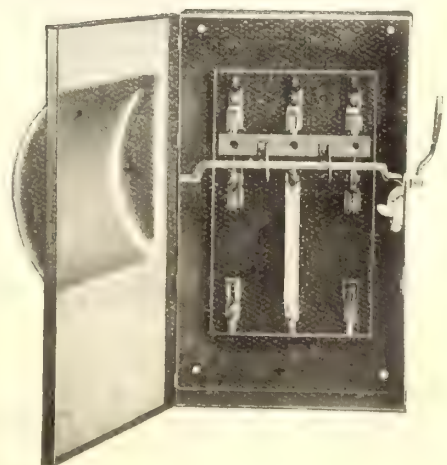
117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

Externally Operated Switches



Langley's Externally Operated Switches are the product of a factory which for 10 years has been manufacturing steel cabinets and cut out boxes for the electric trade.



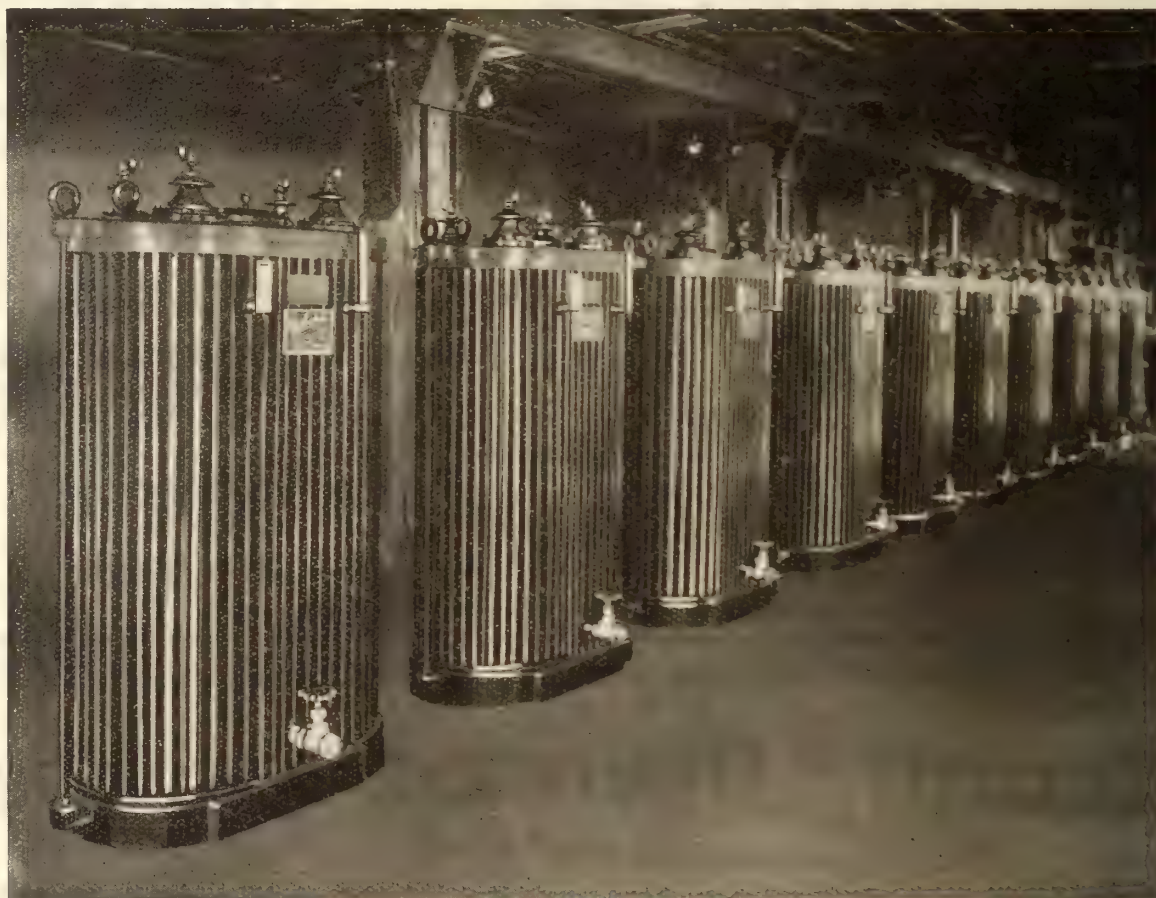
Langley Electrical Manufacturing Co. Limited

WINNIPEG

MANITOBA

Packard

TRANSFORMERS



A Bank of Transformers ready for shipment to the Queenston Generating Station of THE HYDRO ELECTRIC POWER COMMISSION OF ONTARIO where appearance as well as quality is essential.

Get in touch with our nearest agent now.

Others may follow, but we lead.

The Packard Electric Co., Limited
St. Catharines, Ontario

401 Temple Building, Toronto

421 Power Building, Montreal

Confederation Life Building, Winnipeg

Agents:

Eastern Electric Co., Limited, St. John, N.B.

J. T. Warren, 738-11th St. West, Calgary, Alta.

W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.

G. M. Gest, Limited

Contracting Conduit Engineers

Head Office
Power Building
Montreal

Vancouver

Winnipeg

Smith Hydraulic Turbines

**Have Justified Their Installation in many
of America's Biggest and Best
Hydro Electric Developments**

The accompanying view illustrates a SMITH RUNNER, 13 feet diameter, made in one continuous casting by means of dry sand cores.

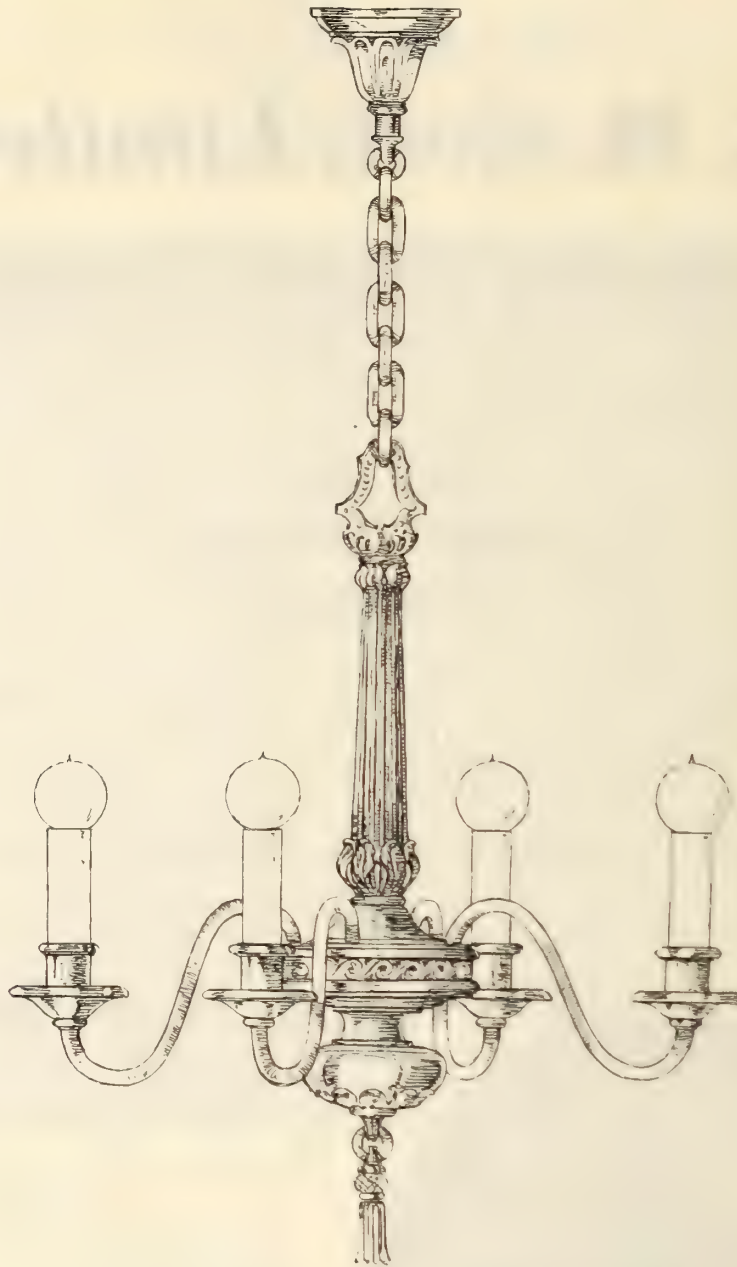
THREE TURBINE UNITS (of which these runners comprise the rotating element) furnished for installation in the Yadkin Falls, N.C., plant of the Aluminum Co. of America. Each unit develops 10,000 H.P. at 90 R.P.M. under 48 feet head, using water at 92 per cent. efficiency.

Write Dept. "N" for Bulletin.

S. MORGAN SMITH CO.
YORK, Pa., U.S.A.

H. B. VANEVRY, Representative
405 Power Building, Montreal





No. 7678 - 5 Lt.

No. 7689 - 6 Lt.

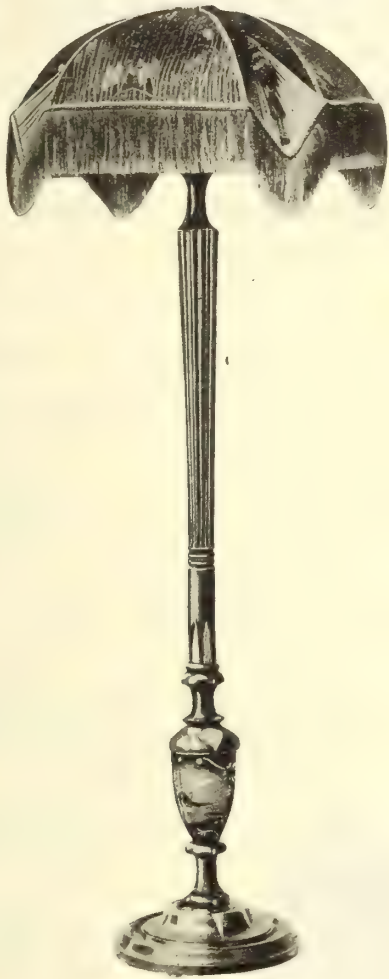
*One of the many new designs shown in our new
Fixture Catalogue No. 5*

If you do not receive a copy by Oct. 1st, write for it.

W. H. Banfield & Sons, Limited

370-386 Pape Avenue

- TORONTO



Sell the "Baetz Line"

The "Baetz Line" of Portable Electric Lamps and Silk Lamp Shades gives you a wide range of designs and a wonderful opportunity for big sales.

You'll like them—so will your customers. To show them is to sell them.

Write for Prices.

Baetz Bros. Specialty Co.
Limited

Kitchener

Ontario



The most adaptable material known—

That's Diamond Fibre, when you come to think of the hundreds of different purposes to which it is put.

Just consider, for instance, the Electrical and Radio Field alone. Diamond Fibre is used for cleats, bushings, switch handles, packings, lightning gaskets, frictions, lightning arresters, conduits, insulating papers, track insulation for block signal systems, and so forth.

Everywhere it is replacing hard rubber and porcelain in an ever increasing degree.

Give us a trial order. Many of our customers purchase Diamond Fibre in its basic form, sheets, rods and tubes, and manufacture their own parts. Others order the completed parts from us.



Visit our new showrooms at 235 Carlaw Avenue, Toronto, and see for yourself the wonderful display of Fibre products on show, or write us your needs and we will send one of our experts to consult with you.

Diamond State Fibre Company
of Canada, Limited.

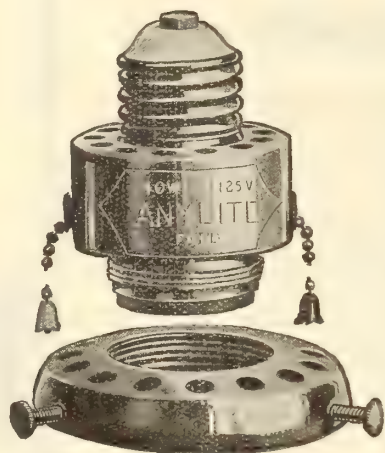
Head Office and Works
235 Carlaw Avenue,
TORONTO, CAN.



ANYLITE PRODUCTS

Are Made for Service

They Boost Appliance Sales Because They Make the Use of Appliances Easier



ANYLITE ELECTRIC REGULATOR combines chain pull socket with electric light dimmer. Will take Uno Shade Holder, will work equally

well on direct or alternating current. Is designed for lamps or devices using not more than 40 watts.

The ANYLITE TWIN SOCKET is just the right size for the work it has to do. It is strong and well designed, the inner construction being made of metal, the outer covering is for insulating purposes only, and is not subject to strain.

The EXTENSION SOCKET enables connection of appliances under narrow type shades, and can be furnished with either black or white covers, the latter make excellent candle sockets. Like the Twin Socket, they are designed for hard wear, there being nothing to shake loose or get out of order.

The small brother of the 4-inch Extension Socket has its own particular use where the larger size would not be quite so handy.

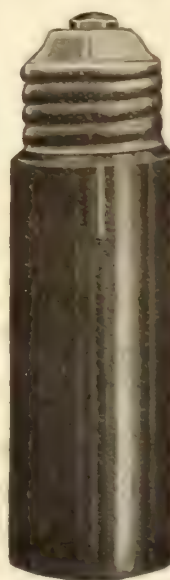
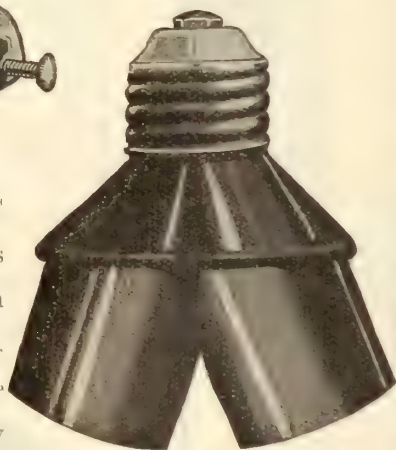
Round out your stock with the Anylite Products. Here is a line of small appliances that can be sold to every one of your customers.

They are all-year-round sellers, but go particularly well during the fall and Christmas season.

There is no danger of being overstocked, as they move rapidly and are easily sold if demonstrated.

Our prices are right and so is our sales policy, while last, but not least, our goods are guaranteed to give satisfaction.

Our list prices are as follows:



ANYLITE REGULATORS.

\$1.25

(mounted 10 on a card)

ANYLITE TWIN SOCKET.

\$1.00

(packed 10 to a box)

ANYLITE EXTENSION

SOCKETS, 4", 50c ea.

(packed 25 to a box)

ANYLITE EXTENSION

SOCKETS, 2", 20c ea.

(packed 50 to a box)



Order from your
jobber

ANYLITE ELECTRIC COMPANY, Fort Wayne, Indiana
THE DOMINION BATTERY COMPANY, Ltd.
MONTREAL TORONTO WINNIPEG

The Commercial

Founded 1882

Dry Goods, Footwear, Hardware, Grocery
& General Merchants Review

An Established Business Paper
that reaches the great western
provinces of Canada.

Goes to the small general store
in the prairie village and to the
large Dry Goods, Footwear and
Hardware Stores throughout the
large western cities.

Sample copy and information
on request.

Hugh C. MacLean Co., Ltd.

910 Electric Railway Chambers
Winnipeg, Man.

FIXTURES

Our new showroom is now
completed.

We have on view all the new
lines and latest designs of
artistic fixtures.

Contractors and Dealers

can use our Showroom for
their customers.

Drop in at any time when
you are near.

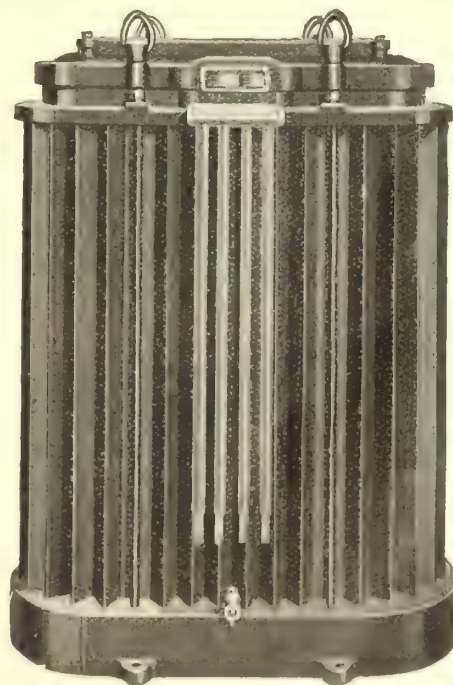
Canadian Electrical Supply Co., Ltd.

165 Craig Street West, Montreal

FERRANTI Transformers

High Efficiency — Low charging
currents.

Ferranti Transformers are
giving others satisfaction in
all parts of the world. Why
not you?



FERRANTI 100 K.V.A. Outdoor Type Transformer,
in Corrugated Sheet Steel Case

Represented in Canada by

Ferranti Meter and Transformer Mfg. Co., Limited

Toronto Montreal Winnipeg Halifax Timmins Calgary

Write to Our Nearest Office. Bulletins, Prices and Information on request.

Don't order just "Loom"—

Specify **"TRIDUCT"**

When you require "Armored Cable"—

Specify **"TRICABLE"**

Stocked by the Better Jobbers.

Selling Agents

Conduits Company Limited

33 Labatt Ave.

Toronto



The "Franklin" Way is For Safety

Investments, paying good dividends with absolute safety, are much sought after.

Safety, as an investment itself, pays the best of dividends.

The "FRANKLIN" way is for safety. Study the detail at the left. Metal bushings, die cast on to the porcelain, insure a strength both mechanically and electrically that cannot be obtained by other methods. Quality of materials, together with the best of workmanship, and years of experience in design, have produced the "FRANKLIN" insulators—second to none.

"INSTALL THE FRANKLIN AND FORGET IT" is not a mere expression of words—it is backed by past service.

Write for descriptive literature.

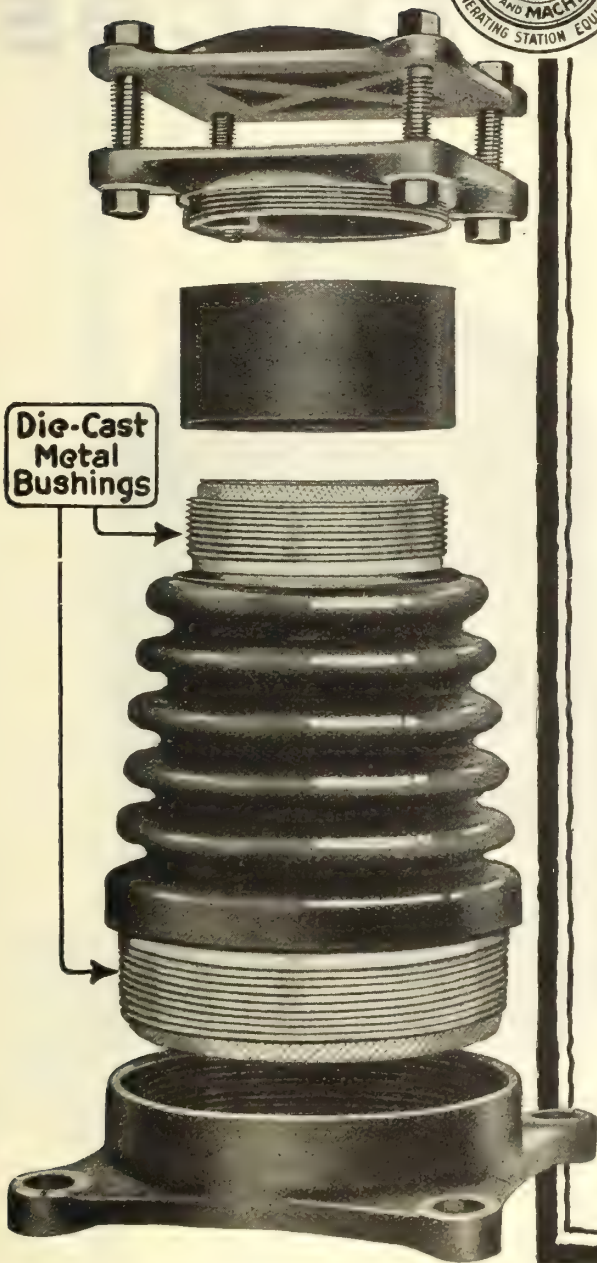
ELECTRICAL DEVELOPMENT & MACHINE COMPANY

PHILADELPHIA

SALES AGENTS

EASTERN STATES
Utility Products Corporation
50 Church Street
New York City

CENTRAL STATES
Midstates Engineering Co.
Westminster Building
Chicago, Ill.



"FRANKLIN"

BUS BAR SUPPORTS

Unusual Services

Our Engineering Services will be found to be keen and resourceful when it is a matter of designing Motors for special and unusual services.

The Illustration shows a Canadian Crocker-Wheeler 350 H. P., 720 R.P.M., 2,200 volts, 3-phase, 60 cycles Vertical Induction Motor for direct connection to a pump.

Canadian Crocker-Wheeler cast welded end ring construction makes a good job perfect.



Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:
Montreal, Halifax, Ottawa, Toronto, London, Winnipeg, Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

**THE CANADIAN
CROCKER-WHEELER CO.
LIMITED**

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL



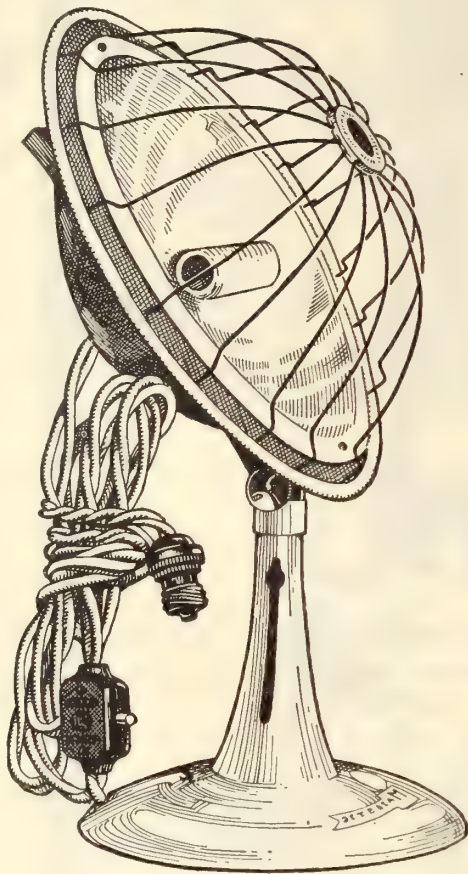
ON thousands of farms and country homes which are equipped with high line and private plant electrical service, R & M power stand motors are performing the many tasks which formerly meant hours of hard labor for the farmer and his family. Designed and built to the Robbins & Myers standard in conformance with the ideas and experience of the leading distributors and manufacturers of farm lighting plant equipment, this motor attained leadership in its field right from the start.

Jobbers and dealers who handle electrical appliances for farm service find in this motor an item which shows a constantly increasing demand. And it gives the kind of service which leads to the sale of the other appliances they can supply.

THE ROBBINS & MYERS COMPANY
OF CANADA, LIMITED

BRANTFORD, ONTARIO

Robbins & Myers Motors



“That’s What They All Say!”

At a big Electric Shop in one of our largest cities they sell a great many lines of appliances. Just as a test we asked them which was the most popular electric heater. “The Majestic,” was the reply.

“Why?”

“Because it is a medium priced heater, gives just as much heat and is guaranteed for one year.”

You’ll find other retailers say the same.

Push the Majestic Heater. Now’s the time. September morn is chilly and so is September eve, but it’s too early to keep the fires going night and day. They need Majestic Electric Heaters.

Make a display of Majestic Heaters in your window and in your store. Talk Majestically, think Majestically, plan Majestically. The chances are good for Majestic business.

The Majestic Heater

The most popular heater on the Canadian market.
Guaranteed for one year—well advertised throughout Canada.

RENFREW ELECTRIC PRODUCTS, LIMITED

Branches

Head Office and Works: Renfrew, Ont.

29 Richmond St. West, TORONTO, ONT.

803 Lindsay Bldg., WINNIPEG, MAN.

The Majestic Heater is one of

The New

Canadian Beauty Electrical Appliances



For nearly thirty years the recognized journal for the
Electrical Interests of Canada.

Published Semi-Monthly By

HUGH C. MACLEAN PUBLICATIONS LIMITED

THOMAS S. YOUNG, Toronto, Managing Director

W. R. CARR, Ph.D., Toronto, Managing Editor

HEAD OFFICE - 347 Adelaide Street West, TORONTO
Telephone A. 2700



MONTREAL - - 119 Board of Trade Bldg.
WINNIPEG - - - Electric Ry. Chambers
VANCOUVER - - - - Winch Building
NEW YORK - - - - - 296 Broadway
CHICAGO - - Room 803, 63 E. Adams St.
LONDON, ENG. - - 16 Regent Street S. W.

ADVERTISEMENTS

Orders for advertising should reach the office of publication not later
than the 5th and 20th of the month. Changes in advertisements will be
made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and
Great Britain, post free, for \$2.00 per annum. United States and foreign,
\$2.50. Remit by currency, registered letter, or postal order payable to
Hugh C. MacLean Publications Limited.

Subscribers are requested to promptly notify the publishers of failure
or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission
as second class matter.

Vol. 31

Toronto, October 1, 1921

No. 19

The Disease of Municipal Ownership that Seems Both Inevitable and Incurable

Although the Toronto street railway system has been under
municipal management less than a month, the developments
surrounding this brief period of operation have been sufficiently
fruitful in experiences to demonstrate a number of the weak-
nesses of municipal management. For municipal ownership, it
is contended by its admirers that, theoretically, it is the ideal
system. On the other hand, the opponents scout the idea of
there being any connection between theory and practice and
state that, in effect, "municipal" actually means "political"
ownership. It is interesting to note how far the Toronto ex-
periment appears to bear this out.

Theoretically, a system operated with the people's money
at actual cost pays the same rate of dividend, indirectly, to
the individual as would be paid to the investor under private
ownership. This presupposes equally efficient management. The
advantage to the citizen is that his credit is utilized rather
than his actual cash. A second consideration is the fact that
every citizen, being in a sense a shareholder, is also interested
in seeing that "his" system is as great a success as possible.
Every citizen, therefore, becomes a booster.

The Toronto system was well on the way to realize these
two conditions when the inevitable happened—or it seems to
be the inevitable. Things were running too smoothly and
certain individuals were not getting as much credit for it as
they would have liked. They did not seem to be making any

political capital out of it. One thing led to another until the
mayor and his chief lieutenant—both of whom are aspirants
for the mayoralty next year—refused to sign the agreement
formally handing the control of the system over to the com-
mission that had already been appointed and vested with power
to operate it, beginning September 1. Following this, propa-
ganda work has been inaugurated with an apparent view to
placing every conceivable obstacle in the way of the smooth
operation of the railway system. Citizens have been advised
not to pay their fares, or only to pay so much; advised to boy-
cott the railway system entirely. Idiotic suggestions have been
thrown out that under a different management the cost of fares
might have been less, and with the apparent desire to create
distrust and dissatisfaction in the minds of the general public
other names have been suggested to replace the present per-
sonnel of the staff, which has been tested out for less than a
month. The whole thing is the purest politics.

The discord thus created has encouraged every conceivable
kind of agitator to present his claim. Special considerations
are being asked for by this, that and the other body; special
consideration by different districts. Nothing is settled. Every
thing is expected to be subject to revision and one gets the
impression that the only stable factor about the whole situation
is the Transportation Commission itself and the management,
who, throughout the whole fracas, have stuck to their guns and
followed, as clearly as possible, the course originally mapped
out—which was the result of taking into consideration all the
factors known at the time.

The sum total of the situation to-day is that the citizens,
by insidious propaganda, have been taught to look upon the
bargain they have made, with distrust. It is of no moment
that the propagandists are the very people who urged the bar-
gain in the first place—these things are forgotten every day in
politics. It is, nowever, a factor in the smooth operation of
the municipal system. It is a condition that keeps the best
men from entering the municipal field, and drives them out
after a few years if they do make the attempt. If the city of
Toronto is a fair example of the necessary interference of
politics with municipal ownership, then, sooner or later, muni-
cipal ownership is doomed.

Ontario Safety League doing Useful Work among the School Children

The Ontario Safety League recently offered a number of
small cash prizes to school children for essays on Accident Pre-
vention. The prizes have just been awarded. Mary Nowlan, of
School Section No. 8, Pickering, gets the first prize for chil-
dren under 12 years. Muriel McKenzie, of Cameron Avenue
School, Windsor, gets the first prize for children above 12.
These two essays were brief and to the point and read as
follows:

"How Children May Help to Prevent Motor Accidents"

By Muriel McKenzie

In all communities accidents occur frequently, the ma-
jority being caused by automobiles. However, children may
aid greatly in the prevention of many of these mishaps.

One way is by keeping several rules pertaining to per-
sonal safety. Do not jump on a wagon, for, while getting off
you may get hurt. Do not race a boy or chase a ball on the
street without first seeing that there is no car coming. Also
look out for old persons and little folks, and when crossing
the street do not push other people, as they may fall down
and get hurt.

Let us now look at the matter from the motorist's point

of view. Although some drivers are careless, and others incapable, the majority are not responsible for the damage they do.

In conclusion I will say that if we work together we may some day make this fair Dominion free from motor accidents.

"How Children May Help to Avoid Motor Accidents"

By Mary V. Nowlan

Children are the making of the nation, and should use means of self-protection to aid in prevention of motor accidents.

They can, and may do so by observing the following rules: Use judgment, and especially heed the motor horn. Take advice on "Safety." Form Safety Patrols in schools. Cross at streets with the traffic, and watch the approaching motors. Help elderly people if they become confused. Inform proper authority when discovering washouts or defects in public roads. Always keep on your right side.

They should not play on streets, or public roads, interfere with the driver of the motor, run across streets without looking, or run behind street cars, as motors may be passing on the other side. Nor should they cross in front of approaching motors, steal rides on motor vehicles, or catch on moving cars.

"Life is sweet," the poet said.

Then we will guard our lives.

Immeasurable Opportunities at our Disposal in the Electrical Industry

A kindly word goes a long way with the average man. The publishers of the Electrical News in this respect, at least, are "average." Our special issue of September 15 was published under conditions that three months ago we should have declared insurmountable. It was Phillip Brooks who said, if we remember, "Lord, I do not ask that you remove obstacles from my path; I ask that you give me strength to remove them myself." Not such a bad sentiment, that! No doubt, it had something to do with helping us to remove our obstacles—our men are still on strike—for numerous letters received during the past few days indicate that our special issue is recognized as actually fulfilling the purpose we had in view, viz., to put heart into the electrical industry by pointing out what immeasurable opportunities there are sitting right on our doorsteps. If this issue has made our readers think less of the things they haven't got and more about the wonderful resources they do actually possess, we are repaid.

As we said, we like words of appreciation from our readers, and the following letters were all the more welcome because they were entirely unsolicited. They are chosen—from many more—as being representative of different phases of the industry.

From a Manufacturer

Hamilton, Sept. 20th, 1921.

Editor, Electrical News:

The Quebec issue of the "Electrical News" has just been brought to the writer's desk, and we must congratulate you on this publication, as it looks to the writer that it will be a publication that will be kept by the Central Station Engineers for years to come as a book of reference.

The writer is very well pleased with our ad., and we are placing this particular issue of the "Electrical News" in our library for reference.

N. SLATER COMPANY, LIMITED,

Acme Stamping & Tool Works Branch,
Per W. N. Elliot.

From the President of the Electrical Co-Operative Association, Province of Quebec

Montreal, September 19th, 1921.

Editor, Electrical News:

I think that the publication as a whole is excellent, and I hope that it will be productive of a greater interest in electrical matters both in the Province of Quebec, and in the Dominion as a whole.

K. B. THORNTON.

And This From a Salsman

Toronto, Sept. 17, 1921.

Editor, Electrical News,—

To "obey that impulse" is a habit I formed in early youth, and it is the factor that now prompts me to write you my congratulations on the spanking good issue of the "News" dated September 15th. The general "get up" has the right wallop, radiates a toning effect and is good for business.

Yours truly,

CANADIAN WESTINGHOUSE CO., LIMITED.

Per C. H. Hopper.

Will Speak on Future of Electricity

October 12 is set as a sort of first anniversary, or annual meeting of the Electrical Co-operative Association of B. C., when the principal speaker will be Stephen I. Miller, secretary-manager of the Northwest Electric Service League, of Washington and Oregon, a similar association to the B. C. organization. Mr. Miller is a college man, a professor at the University of Washington, Seattle, and is dean of the College of Commerce in that institution. He finds time to be an aggressive exponent of commercial education as well as lecturing, and incidentally being a moving factor of a very live and progressive co-operative association like the Electric Service League, of which he is secretary-manager.

One of the items of interest about the forthcoming annual meeting is that it is a sort of open forum for the entire electrical industry. Simply because a man or a firm is not enrolled in the membership of the Electrical Co-operative Association is no bar to attending the meeting. The whole idea is to get every one in who is in any way connected with electrical work, with the object in view of mutual improvement in knowledge and in actual practice. The association means to launch a campaign for better industrial and street lighting, and will have some interesting matters up for discussion along those lines.

It may be planning well ahead, but Mr. Rey E. Chatfield, who is now installed and functioning as secretary-manager of the B. C. Electrical Co-operative Association, announces that for next spring the association will stage an electrical show in Vancouver in the form of an electrical home. The plan is to secure a residence just being erected and make it a model of modern electrical service in the home. Every sort of convenience and appliance of an electrical nature will be installed and heads of families will be enabled to see something more than a working model and in this way better grasp the benefits of electrical appliances.

Only Twenty Percent Paid Dividends

Of the sixty-six electric railways operating in Canada during the year 1920, only thirteen declared dividends. A further twelve companies made a surplus, and the remaining 41 showed deficits. The average fare collected per passenger was 5.37 cents as against 5.01 cents for the preceding year.

Ten Million Dollar Power Plant to be Erected at Great Falls, Man.

Work is Under Way on the Development of 168,000 h.p. on the Winnipeg River—Completed in 1924—Will Stimulate Industry

Upon his recent visit to Winnipeg, Man., from the east, A. W. McLimont, vice-president of the Winnipeg Electric Railway Co., announced that satisfactory arrangements had been made for the financing of a new power development at Great Falls on the Winnipeg River, 63 miles from Winnipeg. Edward Anderson, K.C., counsel for the company, is now in the east completing legal formalities. When completed the plant will have a capacity of 168,000 h.p., and will cost in the neighborhood of \$10,000,000. Work on the construction of the plant is already under way, about 200 men being employed there. As the work develops it is expected that from 1,000 to 2,500 men will be employed.

The huge undertaking will be carried out under the charter of the Manitoba Power Co., Ltd., which company is taking over the plant and assets of the Winnipeg River Power Co., Ltd. In the Manitoba Power Co., Ltd., Sir Augustus Nanton, as president, will be surrounded by a strong directorate. A. W. McLimont will be vice-president and the active management of construction and operation will be in his hands. Mr. McLimont's many years experience in managing public utility properties of all classes will be an important factor in the success of the undertaking. The most recent hydro electric development which he was connected with was the 110,000 h.p. plant built by the Georgia Power Co. F. H. Martin is designing engineer for the Great Falls plant, and L.J. Hirt, of New York, the consulting engineer.

Finally Completed in 1922

The Great Falls plant will be constructed in six units of 28,000 h.p. each, and will be finally completed in 1924. In 1914 and again in 1919 preliminary work in connection with this big project was started, but owing first to the war, and then to financial conditions, the work had to be suspended. It was resumed a short time ago, and to date the coffer dam has been built, the site unwatered, and, bunk houses for the workmen, and shops, etc., built. Much of the rock excavation has already been done.

Discussing the question as to what disposition would be made of the immense quantity of power developed, Mr. McLimont stated that he has already organized an indus-

trial research department, headed by experienced electrical engineers, whose duties will be to induce power-using industries to come to Winnipeg. Mr. McLimont expressed the conviction that many new industries would locate in Winnipeg and vicinity as soon as the power was available, and in this regard instanced what has been accomplished in Quebec. In 1919, he said, the Southern Canada Power Co., completed the first installation of a new hydro-development in Quebec, and since that time the industrial depart-



A. W. McLimont, vice-president, Manitoba Power Co.

ment of the company has located 15 large industries in the district served, the industries being the branches of large American manufacturers. Those 15 companies represent an investment, in plant and equipment, of over \$7,500,000.

"The necessity for more sources of electrical energy than already exist in Winnipeg for industrial and commercial purposes" said Mr. McLimont, "is very apparent, and



A perspective of the power development at Grand Falls, work on which has been started

with this additional power available Winnipeg is bound to develop fast as a manufacturing city."

The Winnipeg Electric Railway Co. will be one of the principal customers of the Manitoba Power Co., Ltd., inasmuch as the former will purchase all power necessary for operating its property over and above the power afforded by its own installation at Pinawa. The capacity of the Pinawa plant has already been far exceeded, and the power which the traction company will purchase from the power



F. H. Martin, designing engineer Manitoba Power Co.

company will be used not only for railway purposes, but also for industrial and commercial purposes, while it is planned to heat the street cars with electricity when the new plant at Great Falls is completed.

The plans of the Manitoba Power Co., Ltd., include the

WHAT THE NEW POWER DEVELOPMENT MEANS TO WINNIPEG AND MANITOBA.

Employment of from 1,000 to 2,500 people.

Average monthly wage bill of \$125,000.

Purchase locally of supplies and provisions for employees on works amounting to over \$20,000 each month.

Purchases through local houses of equipment and tools totalling over \$750,000.

Purchase of 160,000 barrels of cement from local plants.

Purchase of 2,000 tons of structural steel from local shops.

Purchase of 100,000 bricks from local yards.

Purchase of 2,000,000 ft. of lumber from local yards.

Erection of a terminal station in Winnipeg at cost of over \$500,000.

Bringing to Winnipeg and vicinity new industries, when power is available, employing at least 2,000 men.

Assures future development of Winnipeg as thriving manufacturing city.

Guarantees to Winnipeg and vicinity an unfailing supply of cheap power.

erection, at a cost of over half a million dollars, of a terminal station in Winnipeg, though no announcement is made yet as to the site on which such station will be built.

The site of Great Falls is easily accessible. Already an affiliated company---the Winnipeg River Railway Co.,---has constructed and placed in operation a standard gauge railroad, 13½ miles long, from the C. P. R. tracks at Lac du Bonnett to the Falls. When the plant is completed it will represent a splendid engineering accomplishment. The dam to be erected will have a maximum height of 70 ft., and a total length of 3,000 ft., and will create a pond or storage reservoir of 1935 acres, providing a deep, wide and extensive body of water reaching upstream a distance of five miles. The sluiceway section of the dam will be 530 ft. long, and will have capacity to discharge the maximum flow of the river without danger of flooding the headworks.

Much thought and attention is being given to the planning of the campsite. The buildings already erected are of a temporary nature, but when the final plans of the whole project are complete, Great Falls will comprise a model townsite with modern utilities and splendid facilities for recreation of the inhabitants.

First Dominion Convention Canadian Telephone Companies

Preparatory work for the first Dominion convention of Canadian telephone companies was arranged at the conference of western companies in Winnipeg last winter. At that time the subject of an "All-Red" telephone system or line across Canada was set down as of prime importance. Further emphasis was given to the subject at the recent convention in Vancouver on August 22 to 25 and definite efforts will be made to interest Dominion as well as Provincial governments in the matter. The convention spent three profitable days in Vancouver and vicinity and then proceeded to Vancouver Island, for the last two days, visiting Nanaimo telephone exchange of the B. C. Telephone Company, and then motoring to Victoria where further visits to points of interest were made, including the Dominion Observatory with its immense telescope, the wonderful sunken gardens of Mrs. R. P. Butchart at Tod Inlet, and an inspection of the telephone service at the provincial capital.

Officials and staff of the B. C. Telephone Company were the responsible hosts of the convention delegates, who were from every province of the Dominion. Included in the entertainment features were visits to the attractive bits of mountain scenery such as Capilano Canyon, in the environs of Vancouver. The trip on that occasion was extended to take in the logging operations of the Capilano Timber Company in the mountains back of North Vancouver, where the process of felling huge specimens of Douglas fir as well as the "topping" of a spar tree, were witnessed.

When the convention opened Mr. Geo. H. Halse, vice-president and general manager of the B. C. Telephone Company, extended a welcome to the delegates and Mr. J. H. Winfield, general manager of the Maritime Telegraph & Telephone Company, replied on behalf of the visitors from eastern points.

Wireless Demonstration

One of the outstanding features of the convention programme was a demonstration in wireless telephony put on by Mr. S. J. Vennes of the Northern Electric Company, to illustrate his paper on that subject. Owing to atmospheric conditions Mr. Vennes made use of a wire---an ordinary bit of covered electric wire---dropped from a higher window of the Hotel Vancouver to a window of the convention chamber. The tele-

phone was then put in commission and a sustained conversation carried on with another operator stationed in the Seymour Street exchange of the B. C. Telephone Company, two or three blocks away. The delegates took turns "listening in" and the words spoken at the Seymour Exchange were invariably heard as clearly as if spoken over an ordinary telephone or in the room. The demonstrator stated that he could have made the test without the wire, but had merely used it as a precaution to ensure the success of the experimental demonstration.

Papers Presented

Following are the papers on technical topics presented to the convention:

Public Relations, by Mr. B. Jones, commercial superintendent Saskatchewan Government Telephones; Telephone Transmission, by Norman M. Lash, chief engineer Bell Telephone Company of Canada; Standard Construction Methods, by W. H. Winters, general superintendent of plant, Bell Telephone Company of Canada; Toll and Rural Lines, by Bruce Baxter, general superintendent Alberta Government Telephones; Gulf of Georgia Submarine Cables, by E. P. LaBelle, general superintendent of plant, B. C. Telephone Company; Automatic Telephony, by R. Young, telephone manager for the city of Winnipeg; Preparation for Cutover to Automatic from Traffic Standpoint, by H. O. Hutt, traffic supervisor B. C. Telephone Company. Many of these papers formed the basis for a number of round-table discussions which featured the convention.

Inter-Provincial Communication

Inter-provincial telephone communication was considered at the Plant and Engineering conference session of the convention.

It was the feeling of all the delegates that some steps should be taken to realize the end in view of a purely Canadian Transcontinental Telephone Line. It was stated by Mr. Winters that it would be almost surely necessary to ask the assistance of the Dominion government; also that the route of the transcontinental railway lines would have to be followed to overcome the geographical conditions of the north shore of Lake Superior. Other features of the work involved were considered; an interchange of toll route and circuit maps between the various companies was recommended.

Mr. Geo. H. Halse expressed the hope that the convention would go on record as in favor of establishing inter-provincial telephone communication. He pointed out conditions local to British Columbia, where the telephone business of the Kootenay and Boundary districts went to Spokane, Wash., owing to lack of direct facilities between those districts and the coast cities of the province. He considered it was a matter of national importance, which view was endorsed by Mr. J. H. Winfield, general manager of the Maritime Telephone & Telegraph Company. The co-operation of the various companies and of the governments, provincial and dominion, was necessary to realize the project. As a telephone man he hoped the day would soon arrive when, instead of only a band of steel from coast to coast, and a 120-hour journey linking the furthest east with the furthest west, a band of copper and a few hours would bind them still closer.

Standardization

Standardization of plants and practice was an ideal dwelt upon at the conference of Plant and Engineer members. Interchange of rules, routines and specifications was necessary to that end. Other subjects discussed were electrolysis and the hazards to telephone plants from stray electric currents. Mr. J. E. Lowry detailed the experiences of the Manitoba Government Telephones in the City of Winnipeg. Others also contributed experiences on the same question. High tension problems and

the question of railroad crossings were discussed. There was some difference of opinion as to the powers of the Board of Railway Commissioners in regard to the crossings and parallels on highways. On the subject of plant methods, Mr. Winter stated that the Bell Telephone Company of Canada would be willing to sell printed specifications which they may have on hand, provided the first page be replaced with a page bearing the name of the company purchasing and using the specifications. Other matters of purely plant nature were discussed during this conference and resulted in gain of mutual information on the part of the members.

Resolutions

Under the head of resolutions a motion was adopted that a committee be appointed to investigate and recommend for adoption, standardized regulations covering the following problems, as they affect Canadian telephone institutions: 1, electrolysis; 2, high tension interference, and 3, joint pole construction. Included in the same resolution it was provided that such regulations be submitted to the proper authorities for the purpose of securing legislation necessary to have such recommendations put into effect at the earliest possible date.

A resolution was adopted to appoint a committee, composed of a representative from each system, to compile and furnish data on "depreciation" in connection with telephone plants. It is also approved by resolution that the association furnish its constituent members a list of all department heads of each of the companies, and that each member company shall furnish the respective department heads of each of the other member companies a copy of all circulars, routines and other official information or data issued by such company department.

Before the convention closed Montreal was decided on as the place for next year's convention. Mr. W. H. Winter, general superintendent of plant, Bell Telephone Company, Montreal, was elected president and Mr. W. H. Black, of the same company, was elected secretary.

The committee which prepared the programme for the convention and to whom much of the credit for the entertainment of the delegates is due, was composed of officials of the B. C. Telephone Company. Mr. N. G. Fitchpatrick, general traffic superintendent, was chairman of the committee; Mr. A. H. Lemmon, chief engineer, was secretary, and Mr. E. F. Helliwell, general commercial superintendent, and Mr. E. P. LaBelle, general plant superintendent, were the other members.

Manitoba Power Commissioner Resigns

J. M. Leamy, provincial power commissioner for Manitoba, has resigned. He left Winnipeg on July 27th to accept a position with an eastern firm. For the present, his successor will be J. Rocchetti, chief engineer of the commission, who has been placed in charge of a reorganization of the department to put the commission on an operating basis, instead of a construction basis as in the past. Mr. Rocchetti has been connected with large engineering works in Europe prior to his connection with the power commission, and is a graduate of Italian and French universities. Mr. Leamy was appointed power commissioner in May 1919. Prior to his appointment he was engaged on construction work on the Hudson Bay Railway, the Greater Winnipeg water district line, and the City of Winnipeg hydro-electric line as engineer.

New Dalyte Price List

The Dalyte Electric, Ltd., Guelph, Ont., have issued a new price list on ordinary tungsten, street light and gas-filled lamps, effective immediately.

"Electricity" at the Canadian National

Try to imagine, if you can, the Canadian National Exhibition—without electricity. Contrast, if it is not too great a stretch of the imagination, the illumination of, say, twenty-five years ago with to-day; the lifelessness of the exhibits without power to operate them—power, carried along a little wire, invisible, harmless, yet available in the remotest corners of the most out of the way building. Without a moment's hesitation you say, "It is electricity that makes the Fair possible."

And yet every electrical man will confess, I feel sure, to a feeling of disappointment that "his" industry—the basis of the whole show—should receive as little recognition as it does. There are many outstanding features of the fair—the display of art, automobiles, live stock, the midway, etc., that get infinitely more attention. Indeed, it is safe to say the new car of the Toronto Transportation Commission attracted more attention and aroused more interest than all the electrical displays put together. If we are honest with ourselves, we must admit the truth of these things.

The fault, whatever it is, is somewhere; and the solution, whatever it is, is somewhere. We are inclined to feel that the Exhibition authorities have not shown themselves sufficiently sympathetic with a great, big, concentrated, co-operative electrical display—else they would provide a building suitable for it. On the other hand, we cannot but feel that the industry itself is very largely to blame. Instead of co-operating, the various exhibitors act individually; instead of planning months ahead, decisions to exhibit are frequently made only a few days or a few hours in advance.

It is true there is a so-called Electrical Building, but it's only nominally so. What would we think of automobile displays, instead of concentrating in the Automobile Building, being distributed all over the grounds, under the grandstand, in Machinery Hall, etc.—or if any of the other exhibits were scattered in this way? Come to think of it, the electrical exhibits are the only ones where little apparent effort is made to present a united front, and to actually show the visitors to the Fair what electricity is and what it can do. There is no concerted plan of action—no evident intention on the part of the exhibitors to interest the visitor in the use of electricity in general. They think only of their own little appliance.

Of course, it goes without saying that the electric exhibits in themselves were wonderfully attractive. The material is there. Electrical appliances in themselves are more interesting both in their appearance and application than most other exhibits, but the point is that the industry fails to make "a definite impression." The visitor goes away under the influence of the glamour of light and the wonderful argument of the salesman of this, that or the other washing machine, but with a very indefinite idea of the tremendous force that electricity is exerting and the tremendous part it is bound to play in the future of the nation.

The first thing the electrical industry needs is a hand-picked Exhibition Committee of enthusiastic, influential men who are seized with the idea of making electricity stand out as a prominent feature of the Fair. The first duty of this committee would be to bring whatever pressure is necessary to have the biggest building on the grounds, and the most centrally located, handed over to them. Their next duty would be to plan ahead so that every feature of the electrical industry should be represented in that building, from the utilization of a stream of water to its application in lighting and heating; to apportion the amount of space that shall be occupied by each step in these various phases, and to see to it that representative

firms do not fail to answer the roll call. It is quite time the impression of the average visitor to the Fair regarding the electrical industry, namely, that it consists chiefly of lighting, and in operating legion types of washing machines, should be rectified.

We are printing below a few words about each of the exhibits, as we saw them. If we missed any of them we are sorry, because we did look in every cranny and corner of the grounds. In the few words about each, however, we must confess to a considerable repetition. We believe this was the fault of the manner in which the exhibit was staged, and is unavoidable under the circumstances.

HURLEY MACHINE COMPANY

A complete line of appliances was shown by the Hurley Machine Company. The well-known Thor line appeared to its best advantage. Housewives did not pass this booth; they stopped and observed the performance of washer, ironer and dishwasher and asked questions. The new Luminoid cylinder of the Thor washer attracted a great deal of attention.

THE BRANTFORD WASHING MACHINE CO.

Sturdily built, and of fine appearance, the Locomotive washer displayed by the Brantford Washing Machine Company appeared to live up to its name. Much interest was shown by the public in the manifold adaptations of this machine.

MEYER BROS.

The exhibit maintained by Meyer Brothers included the Canadian ironer and electric washer. A feature of this exhibit was an hotel size washing machine. This washer was made for the House of Refuge at Welland and is equipped with 1 h.p. motor, reversing wringer, and has a capacity of 65 shirts.

BEATTY BROS. OF FERGUS

The White Cap electric washer and wringer was prominently displayed by this firm, and their demonstrators were kept busy showing its easy operation. Its features of enclosed gearing, easy wringer and white-top tub appealed to many female visitors, and much interest was exhibited.

GILLESPIE-EDEN CORPORATION

The Eden electric washing machine, with its sediment sink, was the centre of much interest. Its features of enclosed gears, no oiling, and safety swinging wringer were fully demonstrated. The sediment sink feature also appeared to make an appeal to the women spectators. Many inquiries were answered relative to this machine.

NATIONAL ELECTRIC HEATING COMPANY

With ample space to show a variety of electrical appliances, an effort was made by this company to give the housewife a complete idea of the possibilities of electric help. All sizes and types of ranges were shown, with different sizes of heating elements and switch arrangements. National Electric irons, toasters, grates, water heaters and portable heaters were also well displayed.

MITCHELL VACUUM CLEANER

A Canadian-made vacuum cleaner, this machine was exhibited to many visitors. Points demonstrated were its ball bearing motor and easy brush action.

RENFREW ELECTRIC PRODUCTS

The display of this company featured many well known household appliances. Grate heaters in various styles were shown to advantage and a striking display was made of household electrical appliances, such as toasters, grills, percolators and irons (Canadian Beauty).

MCDONALD & WILLSON

Messrs. McDonald & Willson concentrated on well known appliances, and by their display and demonstration of the Trojan washer, Horton ironer and Apex vacuum cleaner drew home to the public the fact that the day of hard work for the housewife is over. The Trojan washer was continually in action, the Horton ironer also displayed its good points, and the Apex cleaner performed to the satisfaction of all concerned.

McDonald & Willson maintained three booths, two in the Electrical Building and one in the Industrial Building, and the variety and tasteful arrangement of all the appliances which they displayed reflected credit on electrical merchandising in general.

CANADIAN SHADE COMPANY, LTD.

A very bright booth was maintained by the Canadian Shade Company. Here one saw electric fixtures and shades in great variety and in pleasing arrangement. The Par-meto shade was displayed to advantage. Hand-painted washable shades were also prominently shown.

STANLEY J. BROWN, LTD.

Electric supplies were shown in wide variety in the booth of this company. Many visitors were drawn by the fine appearance of the display, which included an artistic arrangement of fixtures and portable lamps.

THE "BLUE BIRD" WASHER

The machines of the Blue Bird Corporation seemed to have a peculiar attraction for ladies, judging from the remarks that were passed on the fine appearance of these washers. The continuous and able work of the demonstrator in charge of these machines drew many inquiries from visitors.

DOMINION STEEL PRODUCTS COMPANY

That the long desired convenience of electric light is now easily accessible to any country home was clearly proved by the exhibit of the Dominion Steel Products Company. A small isolated plant was shown in full working order, and its sturdiness and simplicity interested many visitors. The variety of this company's product was evidenced by another exhibit in Machinery Hall, a high compression Diesel engine, which was operating a generator suitable for village or small town lighting. The handsome appearance and smooth running of the combination was frequently commented upon.

THE NORTHERN ELECTRIC COMPANY

The variety of products handled by the Northern Electric Company was exhibited to advantage in two large booths, one located in the Electrical Building and the other in the Industrial Building. Mr. R. A. Barbour was the efficient demonstrator of an automatic telephone outfit which attracted a great deal of attention. A non-interfering successive fire alarm box for municipal use was a feature of the same booth. The exhibit shown by this company in the Electrical Building featured the adaptation of electricity to lightening the labors of the farmer, showing the attachment of electric motors to farm equipment. Many household appliances, soon to go on the market as a complete Northern Electric line, were shown in this booth.

R. A. LISTER & COMPANY

This company exhibited, among their other products, a complete isolated plant for use in country homes. The generator is gasoline engine driven and the complete outfit is furnished with or without batteries. A continuous demonstration was carried on.

EUREKA VACUUM CLEANER COMPANY

Housed in a bright and snappy booth, and continually in action, the Eureka vacuum cleaner drew the attention of many visitors. The various features of the machine were frequently explained; its freedom from complicated parts and adjustments; its light weight and mechanical perfection, were fully demonstrated. A feature of this display was the exhibition of duplicates of a number of medals won by the Eureka vacuum cleaner in various exhibitions.

CANADIAN DRILL AND ELECTRIC BOX COMPANY

The well-known features of the switch boxes which are manufactured by the Canadian Drill & Electric Box Company were attractively displayed in the booth which that company maintained in the Electric Building. All standard sizes and types were shown. An unusual feature of the display was a large enclosed switchboard, which had just been built for the Standard Theatre, and a smaller one which had just been completed for an electrical contractor.

THE MASCO COMPANY, LTD.

With the slogan "Morning is Young but Washing all Done" prominently displayed, the booth of the Masco company formed a very appropriate setting for the A B C electric washer and ironer. The workmanlike appearance of these machines proved very attractive; the sturdy motor and heavy tub of the washing machine were points which the demonstrator

made full use of. The washer has a capacity of six sheets. The wringer is of the swinging type, and can be locked and operated in any position. Excellent mechanical design and good workmanship are some of the points claimed by the company. The A B C ironer has a 45-inch roll and shoe, and enclosed parts; it can operate from any A B C washer or with individual motor.

THE HUBBELL ELECTRIC PRODUCTS COMPANY

The Hubbell twin toaster-grill was strongly featured in this company's display. Situated in a large booth in the Electrical Building, the shining finish and attractive appearance of the various appliances drew much attention from the public. A daintily arranged and completely appointed breakfast table, carrying products of Hubbell cooking, was a striking feature of the exhibit. The well-known toaster-stove was also demonstrated.

CANADIAN RENULIFE ELECTRIC COMPANY

The Renulife violet ray high frequency generators were displayed in a most attractive manner in a booth which was trimmed in violet to match the rays of this machine. This Canadian product is manufactured in many different types to suit all needs, either private or professional. The beneficial effects of high frequency current were explained by the demonstrators and the number of inquiries received from the public would indicate that there is a very general interest in this type of apparatus.

SLADE MANUFACTURING COMPANY

The "Klymax" washer was the feature of this company's exhibit, and the observer could not fail to be impressed with the performance of this machine. Made in Canada, of the best materials, operating on scientific principles, elimination of water lifting and wringing were some of the claims put forward by the fluent demonstrator. The machine is motor-driven, gas heated, washes on the vacuum cup principle, with varying stroke, and dries the clothes by the aid of centrifugal force, which draws the water out as the clothes are whirled around. The elimination of water lifting is accomplished by hose connection to water pipes and the use of a small pump. An inner copper tub is used and aluminum and brass are freely used in the other details.

EARLE ELECTRIC, LIMITED

With a tastefully arranged booth and energetic demonstrators, the Earle Electric drew much attention to their display of Canadian Maid and Miss Simplicity electric washers and electric Sweeper-Vacs. The simplicity and sturdy all-metal construction of the Canadian Maid washer were quite evident from its appearance; the fact that it has solid copper tub, full quarter horse power motor, machine cut gears, direct drive, oscillating movement, and full 12-inch swinging wringer were brought out in demonstrations. The Miss Simplicity is another washer, of the wood tub type, which is also manufactured by the W. A. Kribs Company and distributed by the Earle Electric. This machine is equipped with quarter horse power motor and reversible wringer with extra long rollers. Ease of operation and quiet running are points claimed for this type.

The electric Sweeper-Vac display created an unusual amount of interest. This versatile vacuum cleaner combines the features of the plain suction type and the motor driven brush type. A worm drive is used, which makes possible the use of a high speed motor and fan to produce a powerful suction and at the same time any desired brush speed. An interesting feature of the display was a Speed Guessing Contest, to feature the motor driven brush principle.

JACK FROST REFRIGERATORS

A unique and interesting display was arranged by the Toronto Laundry Machine Company in the Industrial Building, featuring their iceless refrigerator. Household and commercial sizes were shown, including a butcher's cabinet with a stock of perishable goods.

DOWSWELL, LEES & COMPANY

The noteworthy feature of the Dowswell, Lees & Company display was the attractive manner in which their power-driven washing machines were exhibited and demonstrated. Their New Century machine attracted a good deal of interest; it is of the rub-board type, has enclosed gearing, Porter motor and cypress tub. A steel stand and power wringer are included in its equipment. The Seafoam, Style "A," is another machine featured by this firm; it is equipped with a 1/6 h.p. motor, all metal wringer, cypress tub, and has a cover that can be raised

or lowered without stopping the machine. A power wringer, of large capacity, for hotels and institutions was included in this company's display.

NINETEEN HUNDRED WASHER COMPANY

The booth and exhibit arrangement of the 1900 Washer Company was designed to drive home the idea that with the use of their washer it is possible to do away with the worries of wash-day. Featuring the 1900 cataract washer, the demonstrator put the machine through its paces many times. Equipment of this machine includes Canadian General Electric motor, copper tub, cast frame, reversible power wringer, and straight gear shaft. A feature of this machine is the figure eight motion which swishes the water through the clothes. Other types of straight agitator washers were shown, some with Virginia cedar tubs. The 1900 ironer, also on display, embodies several improvements, such as open end, wide shoe and shoe release. A feature of this machine is the large heating surface.

OHIO COFFIELD COMPANY

Many a housewife, and prospective housewife, visited the booth of the Ohio Coffield Company and came away impressed with the claims that are put forward for their machine. This machine is made in Canada and embodies the latest features of power-driven washer construction; it is driven by a Westinghouse motor and has a cast frame. The copper tub is rust-proof tinned and is very nicely balanced. A notable point in the design of this machine is that it is equipped with oil-less bearings. The wringer which is supplied is also motor driven and reversible. Claims which are made for the performance of this machine are that it is of very simple construction and runs with practically no vibration.

J. H. CONNOR & SON

The exhibit of J. H. Connor & Son included samples of all types of washing machines which they manufacture. Their feature machine, known as "Connor Model 2," is the fruit of an experience of manufacturing which goes back to 1874. This model is driven by a Robbins & Myers motor, is equipped with pressed steel stand and extension tub rack, and has a swinging wringer on vertical post, independent of tub. The tub can be tilted for draining and has a full size cover which opens in such a way that easy access is obtained to the wringer. Another popular machine, built by this firm, is their Economy model, which is a popular priced machine built on up-to-date lines.

EASY WASHING MACHINE COMPANY

Several machines were prominently displayed in this company's booth, and many demonstrations were carried out.

ONWARD MANUFACTURING COMPANY

Much comment centred on the Sunnysuds washer display, the machine being quite unique to most people. The washer is all metal, electrically driven, compact and neat in appearance. It is the result of much research devoted to the cause of producing a machine of good quality, compact enough to fit into any kitchen, and large enough to do a good washing. Several special design features may be noted: the cabinet itself acts as the frame and is stamped, turned and braced in a single operation; the wringer is of special type and includes some new features. A strong claim is made for the ease of operation of this washer.

SQUARE D SWITCH COMPANY

At their stand in the Electrical Building the Square D Company exhibited a complete line of switch boxes. A feature of these boxes is the individual mountings, obviating the necessity of a slate base. Much interest centred on their 76,000 type motor starter—a type of switch box which has many safety features; with the switch "on" the cover cannot be opened, though provision is made for key release if it is desired to examine the switch under load. Many inquiries were received in regard to this line of goods.

ELECTRICAL SYSTEMS, LIMITED

The Delco-Light Water System was exhibited by this company and attracted much attention. The possibility of having running water and electric light seemed to appeal to many farmers. A continuous demonstration was carried on.

THE HOOVER SWEEPER

The booth of the Hoover Suction Sweeper Company contained all types of the Sweeper which they manufacture. A chenille Axminster carpet which had been cleaned for eleven years with a Senior Hoover, was on display and showed very

little sign of wear. Another feature of the Hoover display that drew much attention was a Thoroscope—an optical machine by which it is possible to see the motion of the brush, even when it is going at 1,000 r.p.m. A veteran in vacuum cleaner work appeared in this booth, in the person of Mr. J. Skelton, and the Hoover was at its best under his able demonstrations.

JONES & MOORE ELECTRIC COMPANY

Century motors and fans were shown to advantage in the display of the Jones & Moore Electric Company, in Machinery Hall. Automatic start, 3 phase motors were featured. An interesting part of the display was a motor-driven shoe repairer's plant in operation.

WESTCO FARM OUTFITS

The Westco exhibit in Machinery Hall featured a tankless water system, equipped with a ¼ h.p. electric motor. The showing of this plant is an evidence of the conveniences that are obtainable by the farmer in districts where he can buy electric power.

DIAMOND STATE FIBRE COMPANY

The display of the Diamond State Fibre Company was unique and presented an aesthetic arrangement that did not fail to draw attention. The interesting stages in the manufacture of this company's products were well illustrated, including various punchings and stampings. Celeron gears were shown in some variety and many products, ranging from trunks to wire-less apparatus, were displayed.

BEATTIE-McINTYRE, LIMITED

Two prominent appliances were featured by this firm, and many people were attracted by their display of the Laun-DRY-ette washer and the Simplex ironer. The simplicity and easy operation of the Laun-DRY-ette were driven home by the demonstrator of that machine when he allowed a child to run it. The Simplex ironer was well displayed, the abolition of the old type of iron appealed to many, and a great many inquiries were answered.

NORTHERN ALUMINUM COMPANY

Aluminum kitchen utensils and other aluminum specialties were shown in great variety in the booth of the Northern Aluminum Company. The arrangement of the booth and the pleasing appearance of the polished ware did not fail to draw the attention of visitors.

CLEMENTS MANUFACTURING COMPANY

Cadillac Cleaners were prominently exhibited by the Clements Manufacturing Company, and their demonstrator was kept busy showing the powerful action of the machine. With a fan running at 1500 r.p.m., and with its variety of attachments, this machine was well equipped for the tests it was put through. Eighteen machines were on display in the booth.

TORONTO HYDRO-ELECTRIC SYSTEM

The Toronto Hydro electric Commission had one of the most comprehensive and attractive displays at the Exhibition, including practically every kind of electrical device and appliance, many of which were shown in operation. Electric cooking was a most interesting feature of the display, as was also the electric ice refrigerator, shown in operation. Both these labor-saving devices appealed to the housewife on account of the economy in food as well as the saving in household operations they represented.

The centre of attraction, however, was the new electric grate—Magicoal—a product manufactured in England, but which is being sold in Canada by the Magicoal Electric Fires, Limited. This grate is unique in that it gives the impression of a moving flame, very natural in its effect. The Toronto Hydro state that this heater attracts a great deal of attention.

W. H. Banfield & Sons have sent out a handsome catalogue describing their lighting fixtures, portable lamps, and electrical devices of various kinds. This catalogue has been carefully compiled in a comprehensive form and shows a complete range of moderately priced electric fixtures and portable lamps that have the artistic appearance of more costly goods. Considerable space is given over to electrical devices. All the goods illustrated are Canadian-made. A large and complete stock is carried so that all orders may be filled promptly.

English Electric Company of Canada, Limited

The latest considerable development in the electrical industry, locally, has been the formation of the English Electric Company of Canada, Limited, which is associated with and holds the exclusive manufacturing rights in Canada of the English Electric Company of Great Britain, and will, in addition, act as the exclusive agency through which all selling, engineering and construction work in Canada will be done. The Canadian company has the use of all the patents, designs and processes of the English Electric Company, and also holds the right to sell its products in the United States and Newfoundland.

To fully appreciate what this connection means, it must be pointed out that the English Electric Company, Limited, of Great Britain, is one of the three large electrical concerns in the British Empire equipped and organized to manufacture and install a complete line of electrical machinery, equipment and apparatus. The English Electric Company of Great Britain has five large plants in the British Isles and, in addition, has associated companies in many other countries. They have eight branches in the United Kingdom and ten abroad.

The plants in Great Britain include that of the Dick Kerr Works, Preston; the Phoenix Works at Bradford; the Ordnance Works, Coventry; the Willans Works, Rugby, and the Siemens Works, Stafford. Associated companies include Siemens Bros. & Co., Limited; English Electric & Siemens, Ltd.; Consolidated Construction Company, Ltd.; Les Constructions Electriques de France; Les Constructions Electriques de Belgique; Toyo Denki Seize Kabushiki Kaisha, Japan; English Electric Company of Australia, Limited.

The range of manufacture is practically as wide as the uses of electricity itself. Among the various plants are manufactured electrical generating plant of all capacities, steam turbines and condensers, water turbines and impulse wheels, internal combustion engines, rotary converters, static transform-



Mr. Gordon F. Perry

ers, switchgear and controlling apparatus of all kinds, electric locomotives, electrical equipment and rolling stock for railways and tramways, electric plant for rolling mills, iron, steel, copper works, etc.; electric winding equipment for mines; standard industrial motors; incandescent lamps, domestic heating apparatus and electric accessories.

The Canadian company has placed itself on an immediate operating basis by the purchase of the plant of the Canadian Crocker-Wheeler Company, of St. Catharines. This company

was organized in 1910, but has made very rapid progress and is to-day considered one of the most successfully operated Canadian manufacturing concerns. This success is recognized as due in particular to the efficient management of Mr. R. A. Stinson, who is remaining as president and general manager of the English Electric Company of Canada. The growth in volume of business and net earnings and the general reputation for "service" that Mr. Stinson has built up for his old company is a splendid guarantee of the future prospects of the new company of which he now assumes control.

Associated with Mr. Stinson as chairman of the Canadian board will be Mr. Gordon F. Perry. Mr. Perry is another of Canada's industrial successes for, though a young man, he has had a wide and successful experience in the electrical field and has latterly won an enviable reputation as president and general manager of the National Iron Corporation, Limited.

Associated with these gentlemen, as directors, are a number of well-known financial men, including D. H. McDougall, president of Nova Scotia Steel & Coal Corporation, Ltd.; R. A. Daly, president of the Home Bank of Canada; R. Home Smith, chairman of the Toronto Harbor Commission; T. H. Watson, president Canada Machinery Corporation, and others equally well known.

This is practically the first time an English electrical manufacturing company has made a really serious effort to establish itself in Canada by making thorough preparations to meet local conditions and competitions as they actually exist. We believe the field for this company is very large and under the management, as outlined above, we look for the splendid success of the company's operations.

Popularizing Use of Electrical Appliances

The Electric Service Corporation, distributors of Shawinigan power in and around Montreal, are actively engaged in popularizing the use of electrical appliances. They have inaugurated a scheme of holding exhibitions, one of which was recently staged at St. Tite, Que., in the Knights of Columbus rooms there, which lasted a week. The company report they were very pleased with the result, selling quite a number of irons and a lesser number of stoves, washing machines and other appliances. They exhibited a fairly extensive range of material, including an electric cream separator, a small electric water pump, churn, power stand motor and other equipment of interest to farmers, and believe that further business will result from inquiries received at this exhibition. A somewhat larger exhibition is staged for the last week in September at Nicolet.

It is the intention of the company to have special motor trucks for the transportation of this material from town to town and village to village, where exhibitions covering varied periods will be given.

Electric Welder for Large Work

The process of spot welding, as it is called, has been employed extensively for small work such as fixing handles to pots, but until the recent invention of a British machine it was not applied to large articles such as the ventilating cowls of steamships. The process consists in pressing two pieces of metal together by electric terminals through which a current is passed, thus melting the metals together, at the spot between the terminals. In the new machine the metal is supported on a long rigid arm carrying one set of electric terminals and the other set is pressed on the metal from above. Very large sheets of metal can thus be handled with great facility and expedition.

The Electrical Contractor

A Bill for the Examining and Licensing of Electricians and Electrical Contractors in the Province of British Columbia

A Bill has been prepared by Mr. J. Muirhead, inspector of electrical energy for the province of British Columbia, which provides for the examining and licensing of electricians and electrical contractors in that province. This legislation has been under consideration for some time and has been discussed on several occasions and favorably commented upon by the Electrical Contractors' Association, the British Columbia Electrical Co-operative Association, the Vancouver Electric Club and other similar organizations. The Bill is at present under consideration by the provincial authorities at Victoria, and, it is hoped, will be brought before the House at the next session of the Legislature.

The Bill has been prepared following an exhaustive study of similar legislation elsewhere. It is in line with efforts being made in other provinces of the Dominion, and which have already met with success in certain instances, notably in Quebec province. It is hoped that a similar bill will become law in every province within a limited period, as we believe that the success of the industry demands safeguards of this nature. The British Columbia act is worded as follows:

An Act to Provide for the Examining and Licensing of Electricians and Electrical Contractors

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of British Columbia, enacts as follows:

1. This Act may be cited as "The Electrical Licensing Act."

2. In this Act:

(a) Minister shall mean the Minister of Public Works.

(b) Department shall mean the Department of Public Works.

(c) Chief Inspector shall mean the Provincial Inspector of Electrical Energy for the time being appointed under the provisions of the "Electrical Energy Inspection Act."

(d) Inspector shall mean any assistant inspector for the time being appointed under the "Electrical Energy Inspection Act."

(e) Board shall mean the Board of Examiners constituted as hereinafter provided.

(f) Electrician shall mean and include any person who has been actually performing for a period of at least three years, the work of placing, installing, maintaining, repairing or replacing any wires, conduits, apparatus, equipment, fixtures or other appliances of or for a voltage of more than 25 volts between conductors, for or in connection with the producing, transmitting or using of electricity for light, heat, power or any other purposes within the meaning of this Act.

(g) Contractors shall mean and include any person, firm or corporation who or which engages in or intends to engage in the business of contracting on his or its own account for the work of placing, installing, maintaining, repairing or replacing any wires, conduits, apparatus, fixtures or other appliances of or for a voltage of more than 25 volts between conductors, for or in connection with the producing, transmitting or using of

electricity for light, heat, power or any other purposes within the meaning of this Act.

(h) Certificate shall mean a Certificate of Competency issued to an electrician by the Board under the provisions of this Act, and authorizing said electrician to carry on the work specified in sub-section f of this section.

(i) License shall mean a license issued to a contractor by the Board under the provisions of this Act and authorizing said contractor to carry on the business described in sub-section g of this section.

Certificate Required

3. Except as hereinafter provided no person shall carry out any of the work specified under section 2, sub-section f, unless such person shall be in possession of a certificate, or unless such person is actually working only as an apprentice or helper as mentioned in section 29 herein.

License Required

4. Except as hereinafter provided, no person, firm or corporation shall carry on any of the business specified under section 2, sub-section g, unless such person, firm or corporation shall be in possession of a license.

Application for and Issue of Certificate

5. Any person desiring to make application for an electrician's certificate may and all persons before engaging in the work of an electrician shall obtain an application form from the Board and return same duly filled up, accompanied by the proper fee. If the board is satisfied that the credentials of applicant show that he has had three years' satisfactory experience in work as specified in section 2, sub-section f, and that his character, habits of life and knowledge are such as to authorize the belief on the part of the Board that in the interests of safety to life and property and of good standards of workmanship, he is a suitable person to hold such certificate, then he shall be admitted for examination. Every person passing such examination shall have an electrician's certificate duly issued to him.

The Board may, within a period of twelve months only after the passing of this Act and at their discretion and without examination, decide that applicant, in view of his experience and training, is qualified to hold a certificate, in which case certificate shall be duly issued to him. Thereafter certificate shall be granted only after passing of examination.

Application for and Issue of License

6. Any person, firm or corporation desiring to make application for a contractor's license may, and all contractors shall, obtain application form from the Board and return same duly filled up, accompanied by the proper fee. If such person or any one active member of such firm or corporation is already in possession of an appropriate electrician's certificate issued under the provisions of this Act and the Board are satisfied that such person, firm or corporation is by character, habits of life, and knowledge a suitable person or persons to hold a license, then such license may be duly issued to such person, firm or corporation.

No contractor's license shall be issued to any individual person unless such person shall already be in possession of a valid certificate.

No license shall be issued to any firm or corporation, unless one active member of such firm or corporation shall be in possession of an appropriate certificate. Active membership in said firm or corporation shall be proved to the satisfaction of the Board.

Fees Payable on Application

7. Every application for a certificate shall be accompanied by a fee of ten dollars (\$10.00). Every application for a li

license shall be accompanied by a fee of fifty dollars (\$50.00).

If after consideration of credentials, certificate or license is not issued, the foregoing mentioned fees shall be returned to the applicant, excepting that in cases where an examination for a certificate is taken, the fee of ten dollars (\$10.00) shall not be returned. If applicant should fail in the examination, he may submit himself to a second examination free of charge. The fee for a third or additional examination shall be ten dollars (\$10.00).

8. The Board may, if it so decides, endorse any certificate or license which it issues with the particular branch of electrical work which it considers the holder qualified to undertake, and certificate or license so issued shall not entitle the holder to engage in any work other than that so specified.

Board May Give Examination for License

9. The Board may, if it so decides, call upon any applicant for a license to submit to an examination, although such applicant may be already in possession of an electrician's certificate.

A fee of ten dollars (\$10.00) shall be paid on presentation for examination. If applicant should fail in the examination he may submit himself for a second examination free of charge. The fee for a third or any additional examination shall be ten dollars (\$10.00).

10. Every certificate, unless stated therein, shall be granted for life or during good conduct.

11. All licenses shall expire on the 31st day of December in each year, but may without further examination be renewed by the same person or by same firm or corporation as represented by two or more of the same members of firm or corporation, including that member who possesses an electrician's certificate, and in virtue of which certificate, said license was previously granted. A fee of fifteen dollars (\$15.00) shall accompany the application for renewal, and such application shall be made during the month next prior to the date of expiration of said license.

Suspension or Cancellation

12. If it be proved before the Board that the holder of any certificate or license granted under the provisions of this Act is guilty of negligence or has failed to comply with any of the provisions of this Act or with any rules or regulations issued under this Act, such certificate may be marked suspended or cancelled, as the Board may recommend to the Minister, or it may be cancelled in consequence of the findings of a Coroner's Jury or it may be suspended or cancelled by the Minister for any other cause, provided such cause is deemed sufficient by him and is so certified.

13. An appeal from any ruling or decision of the Board may be made to the Minister, whose decision shall be final.

14. Any charge of negligence or infringement of the provisions of this Act against any electrician or contractor or any other person or persons shall be made in writing to the Board, stating the specific charge or charges.

15. Any information or complaint with respect to any offense against any of the provisions of this Act shall be laid out or made within twelve months from the time when the matter of the information or complaint arose.

16. The holding of a contractor's license shall not entitle the holder or holders individually to engage in or perform the actual work specified under section 2, sub-section f herein unless such holder or holders of said license are individually also in possession of a valid electrician's certificate.

Board of Examiners

17. A Board of Examiners shall be constituted consisting of the chief inspector as defined under section 1, sub-section c, and one or more inspectors as defined under section 1, sub-section d, as the Minister shall decide and appoint, together with one other person appointed by the Minister, and who shall be qualified in electrical work and conversant with the qualifications necessary for the holder of any certificate or license issued under this Act. The Board shall meet under the chairmanship of the chief inspector and at such time and place as he may decide, and shall consider the applications and credentials of all applicants for certificates or licenses, and shall prescribe the required examination and supervise and conduct same, and issue all certificates and licenses as they so decide.

The Board shall exercise all such further powers as conveyed to it in any other section of this Act.

Penalties

18. Any person engaging in any branch of the work specified in section 2, sub-section f, subject to section 3, and without being in possession of a valid certificate, shall be liable to a fine of not less than fifty dollars (\$50.00) nor more than one hundred and fifty dollars (\$150.00) for the first offense, and for a second offense a fine of not less than one hundred dollars (\$100.00) or more than three hundred dollars (\$300.00), or to six months' imprisonment or to both such fines and imprisonment.

19. Any person, firm or corporation employing any person to carry out the work specified in section 2, sub-section f, subject to section 3 herein, without such person being in possession of a valid certificate shall be subject to the penalties stated in the foregoing section.

20. Any person, firm or corporation engaging in any of the business or work specified in section 2, sub-section g herein, without being in possession of a valid license, shall be subject to a fine of not less than one hundred dollars (\$100.00) nor more than three hundred dollars (\$300.00) for the first offense, and for the second offense, a fine of not less than two hundred dollars (\$200.00) or more than five hundred dollars (\$500.00) or to six months' imprisonment or to both such fines and imprisonment.

21. Any person, firm or corporation applying for a certificate or license under this Act who makes any mis-statement as to experience or qualifications, or any person, firm or corporation subscribing or vouching to any such mis-statement, shall be liable to the penalties set forth in section 18 herein.

22. If on demand by the chief inspector or by any other person authorized by him, any person performing any electrical work within the meaning of this Act, or any person, firm or corporation engaging in the work of a contractor, does not produce satisfactory evidence of his being in possession of a valid and appropriate certificate or license shall be guilty of an offense, punishable by a fine of not less than five dollars (\$5.00) and not more than fifty dollars (\$50.00).

Every contractor shall keep his license prominently displayed in his place of business, and further, shall keep his name and business address prominently displayed on premises where he is engaged in carrying out any electrical contract.

Temporary Certificate

23. The Board may, where special conditions arise, grant a temporary certificate to an applicant whom it considers qualified, authorizing him to engage in electrical work, provided, however, that no such temporary certificate shall be valid for more than twelve (12) months, and that no more than one temporary certificate shall be issued to any one person. Further, such temporary certificate shall state the special work in which applicant is permitted to engage and applicant shall not engage in any electrical work other than that so stated. Such fees as the Board shall determine shall be paid by the applicants for such certificate.

Any person neglecting or violating any of the provisions of this section shall be liable to a penalty not exceeding fifty dollars (\$50.00).

Special Certificates

24. Where any person is engaged in any occupation in or around or connected with any electrical machinery, apparatus, switch gear, wiring or equipment, and the chief inspector is of opinion that in the interests of safety to life or property such person should have electrical competency, then such person shall make application to the Board for a special certificate. Subject to the approval of the Minister, the Board may draw up such rules and conditions as they think advisable for the examining of such person, and may so examine and issue special certificate. The conditions attaching to the applying for, issuing of and holding of such special certificate and including fees, penalties and other conditions, shall be the same as stated herein for the certificate specified in section 2, sub-section h.

25. Any person or electrician working in contravention of section 24 herein, or any person, firm or corporation employing any person or electrician in contravention of section 24 herein shall be subject to the penalties set forth in section 18 herein.

26. No license or certificate shall be assignable or trans-

ferable. In the case of changes in the personnel of a firm or corporation, at least two remaining members of the firm shall be required to maintain validity of license, and such two members shall include the member who possesses a certificate and in virtue of which the original license was issued to the firm or corporation.

27. If any holder of a certificate or license proves to the satisfaction of the Board that he has without fault on his own part lost his certificate or that it has been destroyed, the Board may, on the payment of two dollars (\$2.00), cause a duplicate of the original certificate or license to be made.

Liability for Nature of Work Done

28. Any contractor in possession of a license shall be held liable for the work done by his employees. Any electrician in the possession of a certificate shall be held liable for the work which he performs or which is performed by any electrician, or assistant, apprentice, helper or any other person under his supervision. Where any electrician can show to the satisfaction of the Board that the nature of his work has been subject to undue influence on the part of his employer, the Board may at its discretion relieve said electrician from the liability for the nature of said work.

Apprentice Electricians

29. No apprentice or helper shall perform or install any electrical work within the meaning of this Act, except as an assistant under the direct personal supervision and in the presence of an electrician duly certificated under this Act.

Infringement of this section shall be subject to the penalties set forth in section 18 herein.

30. All electrical work and operations shall be carried out and performed in accordance with all existing rules, regulations, orders and instructions of the chief inspector and of the Workmen's Compensation Board and of the City or Municipal Inspection Office for the locality in which the electrical work and operations will be carried out or performed.

Procedure for Recovering Penalties

31. All penalties imposed under this Act shall be recoverable before a Justice of the Peace, a Police Magistrate, or a Stipendiary Magistrate. Such Justice of the Peace, Police Magistrate, or Stipendiary Magistrate, in case the penalty awarded by him be not forthwith paid upon conviction, with such costs as shall be awarded, shall levy the same by distress and sale of the goods and chattels of the offender, by warrant under his hand and seal.

32. All penalties incurred under this Act may be recovered, in the name of His Majesty, by the chief inspector or by the inspector, or by any chief constable of the Provincial Police Department; or by any person or persons aggrieved by any act, neglect, or omission; or by any person named by the Minister of Public Works, in writing, on the evidence of one credible witness, who may be any one of the persons before named for the purpose of recovering penalties.

Conviction Not to be Quashed

33. No conviction or warrant of commitment under this Act shall be vacated, quashed, or set aside for want of form, or be removed by writ of certiorari or other process into the Supreme Court.

34. The Board may hold an investigation with respect to any alleged violation or infringement of any provision of this Act, and may summon witnesses and compel their attendance before the Board by the same process as Courts of Justices, and the chief inspector may administer oaths and the Board may examine witnesses with respect to said violation or infringement of the provisions of this Act.

Cases Where Act Not Applicable

35. Nothing in this Act shall be taken to apply to the insertion or replacing of incandescent lamps in sockets or receptacles, the carboning or trimming of street lamps, the lawful connection or replacement of utilization equipment to supply circuits of less than 300 volts between conductors, by means of attachment plugs, or the use or operation of the same or the lawful replacement of fuses in circuits of less than 300 volts between conductors, or such work associated with the manufacture or assembly of electrical apparatus, appliances, equipment or machinery, which the board may decide is of non electrical character or importance.

Further this Act shall not apply to work on telephone or other communication circuits unless such work requires to be carried out on the same poles as wires at a voltage greater than 7,500 volts, or unless such work necessitates climbing past wires on poles where such wires have a voltage greater than 750 volts.

36. The Lieutenant-Governor-in-Council may make rules and regulations for the examination of contractors and electricians and for the issuing of licenses and certificates and in respect to all matters in connection with the carrying out of the provisions of this Act. All rules and regulations made under the authority of this section shall after publication in the Gazette have like force and effect as if herein enacted.

Expense of Enforcing Act

37. The Minister may incur such additional expense as he may deem necessary for the carrying out of the provisions of this act.

38. This Act shall become effective on the date on which it is assented to, excepting that its provisions on imposing penalties shall not be operative until after the 31st March, 1922.

Dominion Steel Products Co's Convention

The Dominion Steel Products Company, Limited, of Brantford, manufacturers of Dominion Light, the well-known Canadian electric lighting plant, held a convention of their Ontario dealers at their main office in Brantford, Monday, August 22nd. Between forty and fifty dealers from all parts of the province were in attendance. The program included general inspection of the factory, and a detailed discussion of the lighting plant. Luncheon was served at the Brantford Country Club.

W. P. Kellett, president and general manager, told of the history of the company and of the "quality" idea that dominates every article manufactured. "It is this quality idea," said Mr. Kellett, "that established our reputation for turning out products of absolute reliability. Quality is always the first consideration, price frequently last. Our first cost may be higher, but the old adage that the best is frequently cheapest in the end always applies."



Dominion Steel Products Convention, Brantford

H. K. Jordan, manager of sales, outlined the company's sales policy. According to Mr. Jordan, sales have been very gratifying in certain sections of the country and inquiries and interest indicate a marked increase in business during the next few months.

The construction of "Dominion Light" was thoroughly explained by Geo. Paddock, chief engineer, and by John Hawes, chief inspector of the Lighting Plant Department. A demonstration of assembling and installing was given, after which each dealer was given further instructions on service.

The convention was reported 100 per cent. satisfactory and the dealers returned to their districts fully enthused over prospects for a greatly increased business this fall.

Mr. T. J. McFadden, Ontario representative of the Diamond State Fibre Company, has just completed a two months' course in technical work at their Toronto headquarters, and is now back on the road again.



BETTER MERCHANDISING



What Publicity Means to Our Industry

H. C. Howard, Publicity Agent W. E. R. Co., makes Strong Appeal to Members of the Industry to Take Advantage of the Wonderful Opportunities

I was rather struck by the novel form of the announcement regarding the luncheon. It tells you that "you and I are being offered \$500 every week and refusing it, because of the fact we are not making the best advantage which the Association's Electrical Page, published each Saturday in the Free Press, offers. It is on this important matter that I want to give a brief address to you to-day.

Were I asked to choose a title for this little talk I would call it "Gin pills or electricity—which?" My reason for that is this—the Association is given, each week, a page in a newspaper with a circulation of 80,000. It can put in that page any message it wants to. If it has no message or, rather, if it fails to give the message it has, the space is taken up by gin pills, or mineral queries, or "what young girls should know," or some such dope as that. It is for you to say what shall go on that page, and if the gin pills appear—then take them, swallow them, you have deserved them.

But before discussing this page in greater detail it may be appropos to first make a few general references to publicity—and what it is able to accomplish.

Perhaps some present in this room are skeptical of publicity and look upon it as a drain upon their revenues, or a waste of good money. But I want to tell you that the term publicity embraces far more than advertising or the spread of printers' ink in billboards, trade papers, etc. It goes right into the very roots of your organization. We use the word publicity for want of a better, more comprehensive term. But there is a personal element about publicity, which I am at a loss to describe by the use of a single word.

The popular conception, of course, of publicity, is advertising—the display of printer's ink. Now advertising plays a very big part in the matter of publicity. For instance, the electrical industry in Winnipeg would not be as big and as prosperous as it is to-day had it not been for the lavish use of newspaper space by several big advertisers, who are repeatedly telling the story of electric appliances, their convenience, etc. Everyone in the industry benefits from the momentum which these big advertisers create, and it is only because of the support which these big advertisers give that the Manitoba Electrical Page is still in existence. If we eliminated three or four regular advertisers from that page—firms which are carrying, in my opinion, a too unequal load—the page would drop through.

So right here I would appeal to the other members of the association, who have goods to sell, to get behind this page and help make its continuance possible. Perhaps some of you

"should-be" advertisers consider that you have tried advertising and it has not produced results. You have run a short and maybe vigorous campaign, and because you have not had to call the police to keep the crowds back, and because the dollar bills have not flowed into your cash boxes directly as a result you have lost your faith in publicity.

I would like to impress upon you with all the stress I can possibly apply, that advertising does not comprise the putting on of a short campaign—and then sitting back trying to trace immediate results. In many cases the effects of advertising may, for the time being, seem intangible, but they are there just the same, and very real effects, too. You can accomplish everything by advertising—or you can accomplish nothing. The word "campaign," as Mr. Harford Powell said recently, is too limited to describe advertising. Don't think of advertising as something done by fits and starts. If you think that advertising can be done by short campaigns just try a breathing campaign for say the extent of twenty deep breaths—and then don't breathe any more until supper time, and see how effective the campaign is.

Keeping Everlastingly at It

If you have been indulging in spasmodic advertising, and have not benefitted from results, it is because you have not told your story strongly enough, efficiently enough, frankly enough, plainly enough, and, most of all, you have not preached that story in season and out of season until you have made the public believe you.

Have you ever stopped to think that of all the great developments in civilization which have made for a better and higher human life, each was, upon its first announcement, its first trial, and possibly for some long time thereafter, derided, ridiculed, or scorned? The telegraph, the telephone, the automobile, the railways, aeroplanes, etc.—all of these things from their inception, and for some time thereafter, were held as unbelievable and impossible accomplishments, were treated with laughter and derision, and came at last into their own **only through the courage of those who stuck to the ship and forced the logic of the situation upon the community.**

The average man is prone to look upon advertising questioningly because it takes time to accomplish results, but what thing worth while in this world has ever been accomplished that has not taken time? You have got to tell your story time and time again, drive it home convincingly, and so design it as to stimulate action. You have to make the public think along the lines that you, the advertiser, desire them to think, and you have to keep repeating your story. The Manitoba Electrical Association, for instance, should hammer home to the people of Winnipeg just what a large sum of money can be saved if those who are contemplating building will insist upon a complete and proper electric installation. The association should, through its page, tell the people, and keep telling them, of the wonderful saving devices there are in the shape of electric appliances. And individual advertisers themselves must keep crying out to the people telling them what their—the public's—needs are, and how completely equipped you are to meet those needs.

So much for the actual advertising or "paid space" pub

licity. Just let me briefly say a word or two about the "personal" element of publicity. This really takes into account the service rendered the public by each individual in the industry. It should be the aim of all of us to be publicity agents for the electrical industry by endeavoring to create public goodwill. This form of publicity begins in the back shop and extends up into office, and from there it projects itself into the daily correspondence and the daily contact which each employee has with the customers. A good product, and a good service, is the root of all advertising. Every transaction is an advertisement—and the manner in which the transaction is made is reflected throughout the whole industry. It is within our power to mould public opinion regarding the industry, and the responsibility in this regard rests on all of us. No one connected with the electrical industry has a larger opportunity for spreading good publicity than the salesmen and salesladies, the cashiers, clerks, telephone operators, and all who come into contact with the public.

First Obligation is "Service"

The first obligation of the industry is to give the highest type of service possible, and not only does this service contemplate courteous treatment of the public, and an accommodating spirit, but technically, good service, no matter how well rendered, becomes a failure, in the absence of courtesy and the spirit of service.

Time forbids me to deal further with the broader aspects of publicity and I will now turn more directly to the opportunity confronting the association to put itself on the map by reason of the electrical page and other sources. In this respect let me say, and I think I voice the sentiments of all members of the publicity committee, that we very greatly appreciate the sympathetic assistance and co-operation which is being given us by the Electrical News, whose local representative is Mr. Chapman, a member of the association. I do not think I am overstepping the mark if I say that the members of the association should show their appreciation of this help by developing the spirit of co-operation the Electrical News is so anxious to foster.

Losing \$500 a Week

And now I come to the page—the \$500 a week offer. During the past two or three weeks it has been my task to get out this page for the association. It entails a couple of hours labor a week, but the time is not grudged so long as it is evident the other members of the association are, in their respective spheres, just as willing to work for the association when opportunity is given. Before I took over this page it was handled by our esteemed colleague, Mr. Art Stunden, whose departure from the city we must all regret. I asked Mr. Stunden this morning if he had a message that I could give to the association for him. And this is what he said: "Tell them I am no grouch, but I do think that so far the Association has failed miserably to take advantage of the opportunity which this page offers. The support has been rotten—there's too big a tendency to 'let George do it,' and to sit on the sunny side of somebody else's fence."

I'm sorry to say that my experience so far bears out what Mr. Stunden's conclusions are after three or four months' efforts.

There has been criticism of this page. I have heard it and you have heard it—and made it. If I ask you to be frank in your opinion of that page, you will—I am open to bet—say: "Occasionally it's good, but mostly it's bad. Why, we see gin pills mixed with electricity and mineral queries with appliances."

You are not committing any offense in holding that opinion,

but I want you to ask yourselves, "Just what have I done to improve that page and to put the gin pills where they belong?"

A Lost Opportunity

I recall coming back to the office one Thursday evening and sweating away to fill up half a column or so of news on that page. I had nothing to say because you fellows had not sent anything in. So I filled up with a boost for the Sunshine Committee and a pat on the back for the indefatigable president and hard-working executive. That sufficed to keep the irresistible gin pills off the page. But while I was worrying my head what to write about, one of our members was giving out a statement to the Free Press, published the same day as the electrical page, about electrical furnaces—just the very kind of material I was wanting to make the electrical page bright and newsy. That article ought to have been on our page. Now I can't go on every week singing the praises of friend Deering here, much as I would like to. We want to take advantage of every single inch of space that page gives us. We have two columns at least a week given to us. If we were to pay for it at reader rates we would pay over \$200 a week, or \$10,400 a year.

If I go to the Free Press and ask them to publish some matter dealing with the street railway situation, even though it may have educational features so far as the public is concerned, I have to pay reader rates—over \$100 a column for it.

Nothing to Say

So with this great gift open to us, we find ourselves, week after week, with nothing to say. We have a message to give to the public, you know we have. Why there are few, if any, selling organizations in the world which have so much of news interest to their customers as has the electric appliance business. The changes in construction, the latest developments in the art, the new appliances and how they save time and labor, the new wiring regulations, etc.—and here let me say that the recent by-law increasing the cost of electric wiring to domestic consumers has not been satisfactorily explained to the public. Why don't you fellows who understand the situation write an article and tell the public. Give it to me, I will dress it up in newspaper clothes, feature it, put the heads on, etc.

The responsibility for getting such publicity as I have referred to—for getting the maximum amount of value out of that page—and it is worth more than \$500 a week to us—lies with you. I'm not an electrical man; my technical knowledge is very limited. I do know something about dressing up stories in newspaper style and making them attractive to the readers. But if you are not going to supply me with those stories, then it will have to be a case of bringing on the gin pills—and after you have taken them—and they are taking their effect, just reflect on the magnificent way you failed to measure up to a golden opportunity to place the electrical industry of Winnipeg on the high plane that its importance warrants.

You have a wonderful opportunity in this page to sell the industry to the public. Do please make use of it—and guarantee it being 100 per cent. electrical by supplying articles, hammering away your message. Don't be afraid of repetition. We've got to force our message on the public, and if you will respond in the manner I have outlined, you will advance not only your own prosperity, but also the Association—the interests of which we all should have at heart.

The Ward Leonard Electric Company, Mount Vernon, N. Y., have issued a folder describing "Tank Rheostats," to be used in series with electrolytic cells or tanks to control the current for electro-plating.

Campaign to Organize Contractor-Dealers

Going Merrily in the Province of Ontario — Many Good Meetings in Various Towns and Cities

The Electrical Contractors and Dealers of Hamilton held an organization meeting at the Royal Connaught Hotel on Tuesday, Aug. 30. This meeting was called for the purpose of organizing a Local Section of the Ontario Association of Electrical Contractors and Dealers. W. G. Jack of the Jack Bros. Electrical Construction Co., was appointed Organization Chairman and R. Farr, of the Arcade Ltd., was appointed secretary pro tem. V. K. Stalford addressed the meeting on association work and the present campaign. At the conclusion of the address a discussion was held and several of the contractors present expressed the importance of this work and the benefits received from better co-operation. Mr. J. Culley moved a vote of confidence in the Ontario Association which was seconded by Mr. F. Thornton and carried unanimously.

All the contractors at the meeting submitted applications for membership in the association. The District Organization is thus assured. Each member offered to bring one or more new members to the next meeting. It was considered advisable to hold another meeting on Sept. 9, 1921, at the Royal Connaught Hotel. The formation of an Electric Development League was very favorably considered and will be discussed further at the next meeting. The following attended the meeting: J. Culley, Culley and Breay; Mr. Geo. Long, Electrical Construction Co.; K. Donohue, Northern Electric Co.; Mr. W. Thornton; Mr. F. Thornton; Sweet & McLaren; V. K. Stalford; W. J. Jack, Jack Bros.; Mr. Geo. Long, Mr. Tait, Canadian General Electric Co., Mr. C. W. Chadwick; Mr. A. Morden, Avis & Jeremy; R. Farr, Arcade Limited.

The September 9 Meeting

At the September 9th meeting several new applications for membership were received. The question of organizing an Electrical Development League in the Hamilton District was discussed. A very strong committee with a representative from each branch of the industry was appointed to bring in a report next meeting on this very important matter. The members of this committee are as follows: L. W. Pratt, Cataract Power Co., Chairman; George Foote, Canadian Westinghouse Co., Mr. Arnold, Boston Insulated Wire Co.; Mr. Broder, D. Moore Stove Co.; James Moncur, James Moncur Electric Co.; Joe Culley, of Culley & Breay; S. T. Turnbull, Tallman Brass Co.; V. K. Stalford.

A Survey in Peterborough

The contractor-dealers of Peterborough held a meeting on Monday, Sept. 12. Several very important matters were discussed, including the present methods of merchandising supplies in the district. Plans were laid for improving this condition and they will be put into effect in the near future. A drive for new members was proposed and approved. A survey was made of the district and the possible number of new members which might be obtained. V. K. Stalford attended the meeting and assisted in the work of the evening. J. Miller, organization chairman, was in the chair.

Doing it Electrically in Ottawa

The contractor-dealers of Ottawa held a meeting on Tuesday, Sept. 13, at 4.00 p.m. The meeting was well attended. Owing to the "Fair" it was impossible for several of the dealers to be present at the meeting. It was proposed to call an

other meeting in the very near future to continue the organization of a District Association. V. K. Stalford addressed the meeting on the work of the association. Several of the dealers had exhibits at the Central Canada Fair which were very attractive and speaks well for the men who are thus putting forth efforts to educate the public to "do it electrically."

Splendid Meeting in St. Catharines

The electrical contractors and dealers of the Niagara Peninsula held a banquet and organization meeting in St. Catharines on September 19th, at 8 p.m., in the Chamber of Commerce club rooms. This meeting was largely attended by contractors and dealers throughout the entire peninsula. It was one of the best organization meetings held during the present membership campaign.

J. A. Sandham of St. Catharines acted as chairman. K. A. McIntyre, W. G. Jack, chairman of the Hamilton District, and V. K. Stalford, addressed the meeting on association work. At the close of the addresses J. C. Clifford moved a vote of confidence in the Ontario Association, which was seconded and unanimously adopted. Eight new members were received into the organization, which will assure a district organization being formed in the Niagara Peninsula.

Temporary officers for the association elected were, J. A. Sandham, chairman, and J. C. Clifford, secretary. Attendance committees were appointed in Welland, Niagara Falls and St. Catharines. It is proposed to hold the meetings in these three cities alternately, the next meeting to be held in Welland, Monday, September 26.

A drive for membership is being started in the peninsula. This is going to be one of the best district organizations in the province, judging from the spirit of co-operation and fellowship shown at this meeting.

The membership in the Ontario Association of Electrical Contractors and Dealers has been increased 100 per cent. to date since the start of the membership campaign on August 1st, with several districts to be organized yet.

The following attended the St. Catharines meeting: J. A. Sandham, St. Catharines, chairman; W. G. Jack, chairman, Hamilton; K. A. McIntyre, Beatty-McIntyre Co., Toronto; J. C. Clifford, Clifford Electrical Co., St. Catharines; F. W. Martin, Martin Electric Co., St. Catharines; M. McKenzie, Sterling Electric Co., St. Catharines; G. L. Sherk, The Lincoln Power Co., St. Catharines; Geo. T. Bowman, Bowman Bros., St. Catharines; T. A. Muller, Muller Flowers Co., St. Catharines; A. J. Desand, St. Catharines; J. Brampton, Niagara Falls; J. H. Sandam Co., Ltd., Niagara Falls; W. P. Dixon, Central Electrical Co., Niagara Falls; F. G. Sage, Welland, Ont.; W. A. Upper, Welland, Ont.; G. J. M. Davis, Thorold, Ont.; C. J. Walters, Humberstone; V. K. Stalford, Hamilton.

The Code at a Glance

The National Association of Electrical Contractors and Dealers, 15 West 37th Street, New York City, have published a little booklet entitled "The Code at a Glance." This is a tabulation of the requirements of the National Electric Code, with a handy glossary defining words and terms that often are misinterpreted. It has been prepared by Hubert S. Wynkoop, M.E., who has charge of electrical inspection in the city of New York. This is a valuable booklet for anyone who has the time to master the details of the Code itself. The requirements are grouped under correlated subjects in the form of chapters and then alphabetically arranged so that they are easily accessible for quick reference by contractor-dealers, wiremen, inspectors and all who use the code. The price of the booklet is \$1.00, postpaid, bound in handy size, 3 inches wide, to slip in the vest pocket.



Fig. 2 — Uptown Power Building, St. Catherine St., W.

Selling the Electrical Idea in Earnest

**Big Montreal Central Station Company
Operating Seven Fine Stores**

Montreal Light, Heat & Power Consolidated, besides serving the city of Montreal and surrounding districts with electric and gas services, operates a large electric and gas appliance merchandising business. Full lines of modern electric and gas appliances are kept on hand and constant demonstrations given to the general public. Owing to the fact that each branch office and salesroom is also a receiving station for payment of the company's bills for lighting and gas services and other accounts, a large number of people enter the branches, which facilitates the means of bringing to the attention of the public the comforts and conveniences derived from the use of the appliances on demonstration. The salesrooms are in strategic locations in densely populated districts of the city and adjacent to the tramways transfer points. Besides the merchandising business other company's business such as contracting for light, heat and power services and business incidental thereto is carried on.

Each branch is self-sustaining, that is to say, each branch is regarded as an individual enterprise and must pay its way out of the profits accruing from merchandising sales.

It is the policy of the company to strictly maintain net re-sale prices and cut rate sales are never run, except in co-operation with manufacturers and jobbers—with the latter principally—for the introduction of special lines or during special sales campaigns. In the sale of high-priced equipment such as washing machines, vacuum cleaners, gas ranges and water heaters, the company gives its clientele the benefit of liberal time payments and experience shows that the plan is a good one and very much appreciated by the public. Merchandising of electric and gas appliances is carried on under the control of the New Business Department of the company, of which Mr. W. O'Brien is manager and Mr. C. D. Slimpin is assistant manager.

The accompanying illustrations will give an idea of the



Fig. 3 — District Branch at 480 St. Catherine St., East



Fig. 4 — 1007 Mount Royal Avenue, East



Mr. W. O'Brien



Fig. 1 — Head Office Building and Sales Rooms

type of branch offices and salesrooms maintained and the magnitude of the merchandising business carried on by this company.

Fig. 1 illustrates the head office building at 83 Craig Street West. A large part of the ground floor of this building is used as a salesroom and for demonstration of electric appliances; also for demonstration and sale of gas ranges and water heaters; the latter forms a large part of the company's merchandising business. Approximately 40,000 people per month circulate through this demonstration room in passing through to the cashier's wicket for payment of accounts.

Fig. 2 shows the Uptown Power Building, 605 St. Catherine Street West. The company is very proud of the salesroom operated at this location, which is recognized as being one of the largest and finest of its kind on the continent, situated on the northeast corner of St. Catherine and Mountain Streets, in the heart of the first-class residential and shopping districts, with show windows on St. Catherine Street and Mountain Street. At this building an innovation in respect of the merchandising of electric and gas appliances has been inaugurated, i.e., a permanent exhibition of electric and gas appliances. In order to educate the public to the comforts and conveniences accruing from the use of such appliances it is regarded that the only way to do so is to keep what they have for sale constantly before the public; advertising, no matter how extensive, will not bring the results desired. Therefore, in co-operation with two of the largest manufacturers and jobbers of electric appliances in the country, and the better known manufacturers of vacuum cleaners, the company has been successful in launching a permanent exhibition where the latest and most modern appliances—electric and gas—will be demonstrated by a large trained force of demonstrators. Not alone "juice" consuming appliances, but the product of allied interests are on demonstration as well, such as wireless telegraphy and telephone, x-ray, telephone equipment, etc., etc. This exhibition opened in full swing on September 15th. Approximately 7,000 people per month circulate through these showrooms for the purpose of payment of accounts, and with con-



Fig. 5 — 2200 St. Catherine Street, East, Branch



Fig. 6 — District Branch on St. Denis Street



Fig. 7 — The Park Avenue Branch

stant demonstrations of the many interesting appliances a thorough education of the public in the use of these appliances is hoped for with resultant benefit to the industry at large.

Fig. 3, the District Branch at 480 St. Catherine Street East, is located in the heart of the French-Canadian shopping district, and a very large business is carried on. An average of 8,500 people circulate through this branch every month. This branch is the headquarters for sale of industrial appliances to the several French-Canadian institutions in the city and district. Periodical demonstrations by exhibitors from the uptown building will be a feature at this branch, as well as at all the other branches of the company.

Another District Branch, situated at 1007 Mount Royal Avenue East, is shown in Fig. 4. This branch is one of the busiest of the branches, and (its patrons are principally mechanical trades people) in point of view of collection of accounts. Approximately 8,000 people pay their bills at this branch. The company is very shortly moving to a newer and more handsome location on Papineau Avenue, near the corner of Mount Royal Avenue, in order to take care of the increasing business at this location.

At 2200 St. Catherine St. East is another District Branch, shown in Fig. 5. This also is located in a district principally composed of mechanical trades people, employed in steel foundries, locomotive works, and this district is the centre of the shoe manufacturing trade. The sale of appliances in this district is surprising in view of depression of trade conditions, and with the revival of trade in general very much increased business is hoped for which will eventually necessitate moving to larger premises. Approximately 5,000 people circulate through this branch every month.

Fig. 6 illustrates the District Branch at 858 St. Denis Street. This branch was opened just a year ago and results of sales are very gratifying; each month shows an increase of merchandising sales, and the number of people paying accounts. It is hoped that this will be one of the busiest of the company's branches. Approximately 4,000 people visited this store during the month of July, and this during a period of the holi-season when many people are out of town.

The seventh store of the company is located at 2,438 Park Avenue. This branch is located in the main artery of traffic to the first-class residential district of Outremont and the north end of the city, and was opened for business in October, 1920. Results are very satisfactory, and as the store is becoming known to the inhabitants of the district business has increased by leaps and bounds. Even though that in this district it is

safe to say 60 per cent. of the householders were out of the city on vacation, nevertheless over 3,000 people visited the branch during the month of July.

The first autumn meeting of the Toronto Section of the Electrical Contractors and Dealers' Association of Ontario will be held on the evening of Tuesday, Oct. 11.

Mr. T. J. Casey, vice-president the Hurley Machine Company, will give an address.

An unusually interesting meeting is promised for this occasion.

Three "Live Wires" in the Electrical Association of Nova Scotia

We are indebted to Mr. E. A. Saunders, secretary Electrical Association, Province of Nova Scotia, for three photographs of "live wires" of that association.

James Farquhar is sole partner and owner of the business of Farquhar Brothers, Ltd., electrical contractors, steam heaters, plumbers, etc., the leading business of that line in Halifax. He is a member of the executive of the association and chairman of the Contractors' Section.

Charles Garroway, also a member of the executive, is sales manager of the Canadian General Electric Co., Halifax branch. He is chairman of the Jobbers' Section of the local exchange.

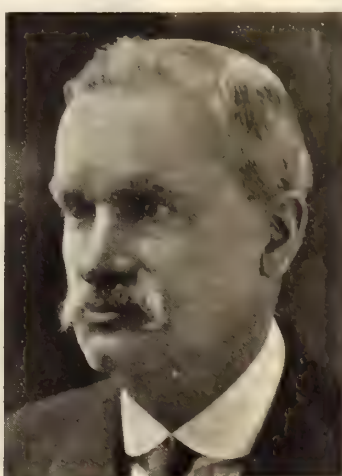
W. H. Hayes is assistant manager of the Maritime Telegraph & Telephone Company. He is on the executive of the association and is chairman of the Telephone Section of the exchange.

In connection with the recent Maritime Convention, held in Halifax, Mr. Farquhar was chairman of the Entertainment and Transportation Committee, and Mr. Hayes of the Programme Committee.

This association has now well over a hundred members who are looking forward to a series of helpful meetings during the coming winter.



Mr. C. S. Garroway



Mr. James Farquhar



Mr. W. H. Hayes

Kenneth A. McIntyre joins Staff of S. E. D.

The announcement is made that Mr. Kenneth A. McIntyre has joined the staff of the Society for Electrical Development, and will look after S. E. D. activities in Canada. Mr. McIntyre's headquarters will be at the Society's offices in New York, but the greater part of his time will be spent in Canada. His activities will not be confined to work among the contractor and dealer interests, but will embrace the entire field in the Dominion, including manufacturers, jobbers and control stations as well.

Mr. McIntyre does not need an introduction to Canadian electrical men. For over nine years he has been engaged in the electrical business in Toronto. For the past three and a half years he has been vice-president of Beattie-McIntyre, Ltd., and has specialized in the contracting end of the business. His association activities have covered a period of over five years. He was largely instrumental in organizing the Toronto Electrical Contractors' Association and was president of that organization before it expanded into the Ontario Association of Electrical Contractors and Dealers and became affiliated with the N. A. E. C. & D. He will still retain the chairmanship of the Ontario Association as well as his financial interest in the firm of Beattie-McIntyre, Ltd., which company he continues to represent in association matters.

For the past three years Mr. McIntyre has been the representative from Eastern Canada on the National Executive Committee of the N. A. E. C. & D., and is still a member of that committee. He is chairman of the Architects' Committee of the same association. He is also a member of the Cost Data Committee of the National Association, and through his paper at the last Buffalo Convention gave electrical contractors some exceedingly valuable data on installation costs.

International Hoover Convention

The first international Hoover Suction Sweeper Company Convention of "Maximen," Division and District Managers, was held recently in North Canton, Ohio. Accommodation was provided in a specially built tented city. Nearly 200 men from Canada, Great Britain and the United States attended the event, the purpose of which was to discuss efficiency in sales work. The "Maximen" were the Hoover representatives who had scored highest in volume of sales during the first six

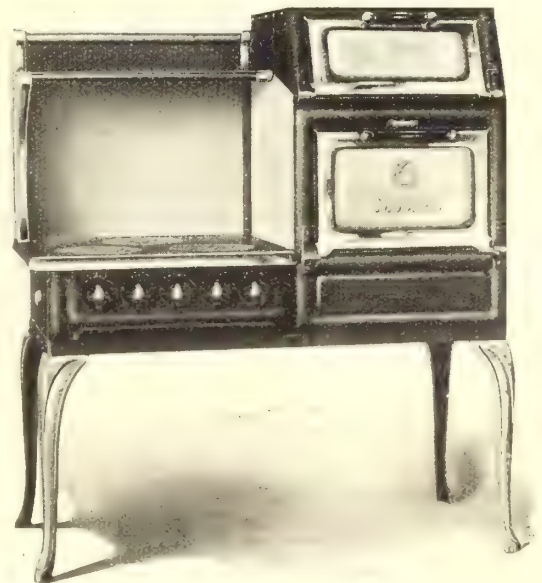


Canadian and English Delegates at Hoover Convention

months of the year. Canada was well represented, as shown by the accompanying photograph of Canadian delegates, with their coats off and their sleeves rolled up prepared to show the other Hoover delegates how Canadians work. The Canadian and British delegates shown in the photograph were as follows: Standing, left to right—Geo. T. White, District Manager, Windsor, Ont.; Elmore Philpott, District Manager, Hamilton, Ont.; J. Skelton, District Manager, Toronto, Ont.; H. M. Potticary, District Manager, Montreal, Que. Sitting, left to right—W. G. Vogt, Office Manager, Hamilton, Ont.; A. Beaton, London, England, office; Thomas F. Kelly, Sales Manager, Hamilton, Ont.; M. C. Dizer, Managing Director, London, England, office; M. R. Clement, District Manager, Ottawa, Ont.

A new Range and Grate

The D. Moore Company, Ltd., Hamilton, Ont., who have been makers of stoves for almost 100 years, are now placing an electric range on the market and in the near future will have a complete line of electrical cooking and heating devices. The range as illustrated herewith has three and four 9-inch top burners, with three separate heats, and so designed as to take small kettles as well as large without any loss of heat. The oven contains two elements, 1,300 watts each, one on the top



A range with several new features

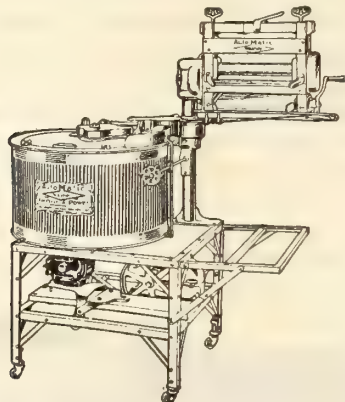
and one on the bottom, which are easily removable, having hinge type connections. Another feature is the flush type of switches used, which leaves no projection to catch on the clothing. The fuses are easily accessible. A receptacle is installed at the side of the range for an electric iron. A folder issued by this company explains the merits of this range at greater length and also outlines a number of advantages of electric cooking.

The D. Moore Company are also manufacturing an electric grate, to which they have given the name "Sun Fire." This is a very efficient heater, and attractive, and the demand for this type of electrical equipment should be very considerable.

Mr. J. Alexander Regan, Quebec representative of the Diamond State Fibre Company has been getting a few pointers in the technical department of the company at Toronto and Bridgeburg during his vacation and has now returned to his duties in Quebec.

A new Copper Tub Electric Washer

The Automatic Electric Washer Co., Newton, Iowa, recently marketed a new copper tub automatic electric washer. They claim it represents the latest ideas in washing machine designing and engineering skill, and has been approved by some of the largest washing machine dealers in the country. Repeat orders are now being received, as well as "standing" shipping orders. Its 16-oz. corrugated copper tub is heavily tinned inside. The lid is cast aluminum, which will not tarnish. The grooves in the slanting tub bottom drain tub automatically. The brass drain faucet is threaded for convenient hose connection. In this new model an entirely new method of operating the Dolly has been incorporated. The Dolly is operated direct



from upright wringer drive shaft, the power being transmitted by means of two gears (fully enclosed), a short pitman, and a segment gear which connects the pitman with ball-socket joint. This style of construction permits of raising lid when machine is running. Each gear unit is self-contained, all gears being fully enclosed. Washer is operated with 1/6 h.p. motor, which drives machine with flat leather belt. This washer is also provided with reversible swinging wringer having 12-inch "power" rolls. Equipped with handy self-locking folding bench for holding one tub; folds down out of way when not in use.

New Showrooms, Diamond State Fibre Co.

This cut illustrates the new showrooms of the Diamond State Fibre Company of Canada, Limited, at 235 Carlaw Ave.,



Toronto, displaying a full line of their varied products, among which will be seen electrical parts, automotive parts, trunks, roving cans, waste baskets, gears, lamp fittings, etc.

Electrical Furnaces for Industrial Purposes

At the regular luncheon of the Manitoba Electrical Association on Thursday, September 15, the speaker, F. H. Martin, designing engineer of the Manitoba Power Company, gave a very interesting talk on electric furnaces for industrial purposes, in which he predicted a growing field for this industry in the future development of Winnipeg. Lantern slides were shown, illustrating many types of apparatus of both large and small capacity, one of the furnace plants shown using over 20,000 electrical horsepower. Mr. Martin stated that where cheap water power is available, the electric furnace is rapidly replacing furnaces using other fuels, and that the development in this vicinity should be more rapid than elsewhere, because the industries would be completely electrified from the beginning.

Recent Lighting Developments

The National X-Ray Reflector Company, Chicago, announce three recent developments in new lighting equipment, as follows: "Scoopettes," for showcase lighting; "Indirect Lighting Art Lamp Adapter," for art lamps; "Portable Flood Light," with color effects—for automobile salesrooms. The Portable Flood Light, which is illustrated herewith, uses a



250 watt, G-30, flood lighting lamp and gives a powerful beam of white light. These are made in two sizes, one of which is adjustable in height from 30 to 60 inches. Both units are adjustable to any angle. Two types of X-Ray reflectors can be used in either to secure a concentration of light or a wide distribution.

A delegation from the Vancouver Electrical Contractor-Dealers' Association attended the Washington State Convention of Contractor-Dealers, held at Yakima, on Sept. 16th and 17th. Among those who attended were president W. W. Fraser of the Vancouver Contractor-Dealers' Association and Mr. Rey. E. Chatfield, secretary-manager of the B. C. Electrical Co-operative Association. A number of other contractor-dealers also attended the convention.

The first station of an Imperial wireless chain, by which it is proposed to establish communication between all British possessions, has been opened at Leafield, England. Messages from this station were recently received by the Barrington, N.S., station.

E. S. Ridgway and E. A. Robinson have joined the sales staff of the Onward Mfg. Co., and will cover Ontario, carrying the Sunny Suds washer and Eureka vacuum cleaner.

Record Sales of Electric Ranges

The Public Utilities Commission of London, Ont., have sold a large number of electric ranges during the summer. During the month of May they sold 156 and for the summer months have also made a splendid showing.

The London Public Utilities Commission state that they have a number of wiremen who, by specialization in the installation of electric ranges, have become more than ordinarily efficient and rapid at this work. For this reason, and no doubt also to the fact that they have been able to buy in large quantities, the Commission have reduced the installation charges on ranges considerably. They have been selling a range with three top burners, and an oven underneath with two burners, for \$98 installed, and Mr. Buchanan says that this enables them to pay their overhead and make a small margin of profit.

Mr. Buchanan believes in advertising. He has used considerable newspaper space as well as a number of billboards around town. He also uses the back of their monthly bills, and, of course, their bulletin the "Live Wire," which is published monthly and is very widely distributed. Newspaper space is looked upon, however, as producing the most direct results.

With rates as they are in London, where current for cooking costs .9 cents per kilowatt hour, the gas range, with gas at \$1.25 per 1,000 cubic feet, loses most of its attractiveness.

The success of the appliance department in London is merely an example of the results that may be obtained anywhere by a few men who believe in the superior advantages of electricity in all household operations.

A Definite Suggestion for Union

Winnipeg, Man.

Editor, Electrical News;

I have read with interest your editorial in your issue of July 15th in reference to the duplication of effort through there being two central station associations functioning in Canada. I presume that everyone is aware that the paralleling of effort is not the fault of the Association of Municipal Electrical Utilities, but to the affiliation of the C.E.A. with the N.E.L.A. Perhaps the latter's attitude may be justified on the ground that municipal electrical functions are not very much in evidence in the United States, but in this country, and as is also the case in Great Britain, the municipalization of electrical services has made much greater headway and these organizations are not without credit. It may be worth while to inquire as to what form of organization exists in Great Britain, as to whether or not the municipalities and companies owning utilities are jointly represented on any association. It is also not out of place to state that while the A.M.E.U. has received splendid support in Ontario, it is, I understand, restricted to the organizations operating under the Hydro-Electric Power Commission's auspices.

Up here in the West we have a good many municipal stations and as far as I know they are unrepresented entirely on the A.M.E.U.

As a definite suggestion, I would say that efforts should be put forward to see if a union were not possible between the two existing central station organizations in Canada. Perhaps under the circumstances a special dispensation might be obtained from the Big Brother. If this is not possible, I would suggest that the scope of the A.M.E.U. be broadened so as to be representative of all municipal electrical utilities throughout Canada. I would hardly think it advisable to split this on to a provincial basis, but I would suggest that a Western and an Eastern section be organized, the dividing line being midway between Port Arthur and Sudbury.

F. A. CAMBRIDGE, City Electrician.

Cutter Pulley-socket Reflector

An almost universal recognition that lighting fixtures must often be cleaned has multiplied the demand for a reliable cut-out and lowering device by means of which cleaning and relamping may be done in absolute safety. A pulley socket reflector, which is claimed to incorporate all these advantages, is made by the Westinghouse company. Briefly stated, the advantages of a Cutter pulley-socket-reflector are: The time saved in cleaning, safety from short-circuits and accidental contact with live parts, the small amount of effort necessary to thoroughly clean the fixture, and the fact that there need be no obstruction of aisles by ladders. A pull on the rope disconnects the principal parts, and the entire fixture comes down



dead. This disconnecting may be made without first switching off the circuit, for within this pulley socket, sliding contacts are provided of sufficient capacity to make and break the current of a 1000 watt lamp. The next pull resets the fixture in place. An angle reflector may be used, as it will always come back to its true position, and locks into place, so that it is self-supporting. All parts are built in liberal proportion, and totally enclosed in a cast iron housing, which is galvanized and then painted. The socket is provided with double lamp switch, under which the lamp is held so that it cannot be loosened by vibration.

A Correction

In our description of the exhibits at the Niagara Falls Convention, which appeared in our issue of August 1 under the heading "Lincoln Meter Company," a sub-head "Graphic Meter" was omitted before the second paragraph. As printed, it was not clear to what this paragraph referred.

To lovers of Robert Burns, Ayrshire is a place of almost sacred pilgrimage, and it will come as a shock to learn that the Town Council of Ayr contemplates an ambitious scheme to produce electric power from the waters of Loch Doon, Ayrshire. This is only one of many proposals to utilize the heavy rainfall characteristic of Scotland. All the promising sources of water power both in England and in Scotland are being closely surveyed.

The National X-Ray Reflector Company have issued three new catalogues. Catalogue No. 22 lists all X-Ray direct lighting products, including show window fittings, showcase lighting, industrial and flood lighting; 40 pages, in two colors. Another booklet entitled "Perfect Lighting for the Home," describes the X-Ray art lamps and indirect lighting adapters. A third booklet describes the flood lighting of the new Wrigley Office Building in Chicago.

Electric Railways

Effecting Economies in Calgary Street Railway Operation

By J. N. LIGHTBODY

During these days of the street railway, when operating costs overtake revenues and often exceed them, leaving a deficit, the managers must make good use of every facility they possess to reduce expenditures.

We have just completed the remodeling of an old stable into a very respectable car repair shop. Fig. 1 shows the building which had been used as a stable for the Public Works Department. It was in a logical location for a street railway shop, so that it occurred to us to convert it into such. The



Fig. 1—Stable, remodelled, becomes Repair Shop

building, which is of brick and frame construction, had two floors, the main floor, which was on the ground and used as a stable, and a second floor, used as a hay loft. The second floor was removed and the roof supported by wooden trusses. The material in the second floor furnished nearly enough lumber to make all the alterations. The windows in the side walls were enlarged. After completion of the work there remained a light,

airy building well suited for a shop.

A considerable saving was effected by using wooden doors covered with sheet metal for the front of the building. The wooden doors are harder to handle than rolling steel doors, but as they were home-made, they cost much less and being of wood help to keep in the heat. Fig. 2 is a plan view showing a general layout of the shop.

The paint shop is completely enclosed with brick fire walls



Fig. 3—Machine Shop, Calgary Municipal Railway

which were a part of the original building. The ceiling, which is of wood, is covered with sheet metal. Rolling steel doors are used in the exterior walls of the building. A hydrant is located in this shop for fire protection, so that the rest of the building is pretty well protected from any fire which may originate here.

The machine shop, shown in Fig. 3, is located alongside of the paint shop. It contains a corner for the blacksmith with a forge, mechanically driven hammer, and other necessary equipment. There are also a large wheel lathe, hydraulic press, machinist's lathe and a pipe and bolt cutter, emery wheel stand, drill press, hack saw and babbiting bench.

The carpenter shop was provided with a balcony which fur-

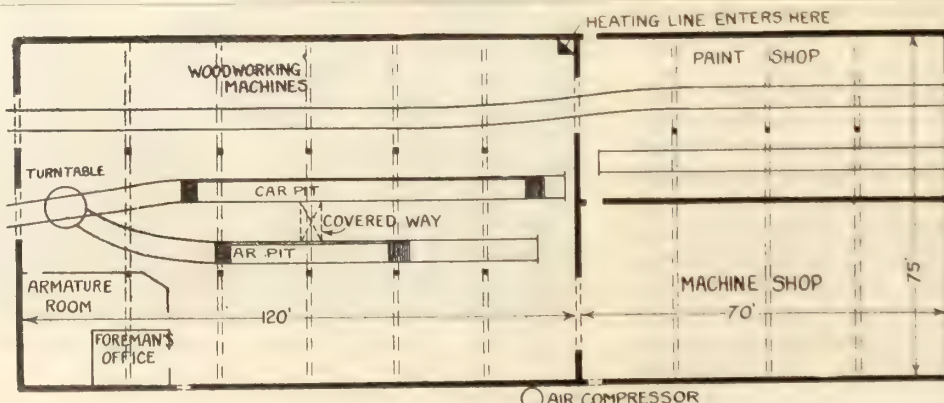


Fig. 2—Plan, showing general layout of repair Shop, Calgary Municipal Railway System

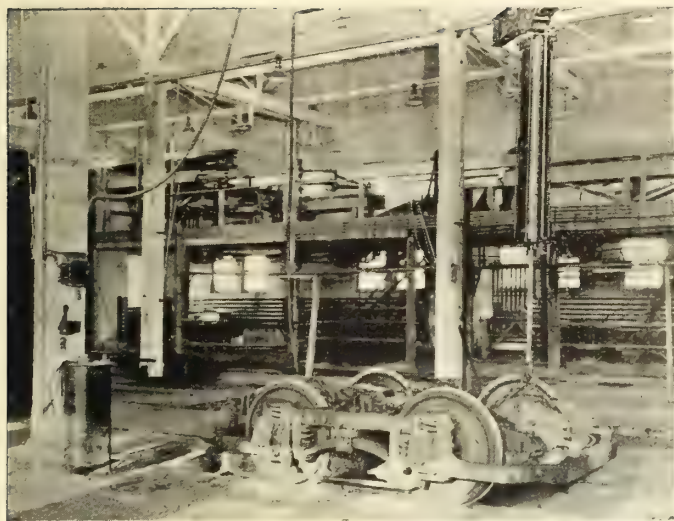


Fig. 4—Carpenter Shop, woodworking machinery in balcony

nished a convenient support for shafting for the heavy machines placed on the main floor. On the balcony above were placed a few light woodworking machines, benches and a lumber drying rack. These are seen in the background of Fig. 4.

Opposite the carpenter shop is the truck repair shop, together with air compressor and controller repair benches. This shop contains also an air compressor of 50 cu. ft. per min. capacity and a receiver located outdoors. The front end of the building contains a toilet and an armature room, with the office and store room above.

The armature room is provided with mono-rail hoist for handling armatures. Some time in the future there will be a universal armature machine installed here. Considerable money was saved in testing equipment by using the Century Electric Armature and Field Tester. Insulation tests are made by applying the trolley voltage (550) to the armature.

The photographs show some air hoists which are home-made. Steel trolley poles are used for the main part. Four of these hoists were supplied, two for handling truck repairs and two for the lathes in the machine shop.

Fig. 4 also shows a device for moving trucks under their own power. An ordinary car controller, fastened to one of the building columns, is connected with a resistance tank for reducing the voltage applied and connected to the truck motors

by flexible leads. This arrangement saves lots of time and works very satisfactorily.

The comfort and safety of the employees was very well looked after. The shop is well heated, well lighted, and the monitor roof provides excellent ventilation. All exposed gears, belts, circular saws, etc., are provided with guards, and safety-switches were used on the motors.

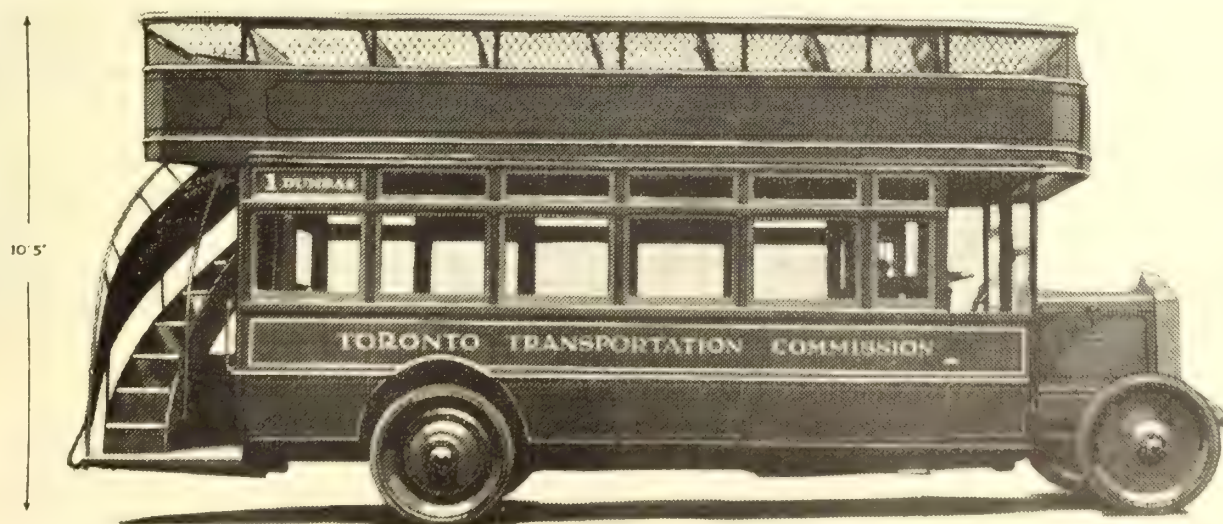
We have not gone in for electric welding very extensively yet, but the machine we have has already paid for itself many times over in the repairs on which we have used it. We repair worn-out gear cases, broken castings, and have had great success in building up cupped rail joints.

We have also erected a wood, coal and sand storage building. All of our cars are heated with hot air heaters, so that large quantities of coal and wood are required. In the coal storage room a hopper mounted on trucks is located. Bags are filled in the passageway from this hopper. Sand is dried with natural gas heaters in the sand drying room. The sand is transferred from the heaters to a concrete hopper, where it is screened and then elevated by a bucket conveyor to the sand tower. It drops from the sand tower by gravity, and a rubber hose is used to direct it into the sand boxes in the cars. The capacity of the storage bins is about 100 tons of coal and 120 tons of sand.

Toronto Transportation Commission Trying Out a number of Motor Buses

The Toronto Transportation Commission are trying out a number of buses on some of the outlying lines. Four buses like that shown in the illustrations have been ordered from the Fifth Avenue Coach Company, New York, one of which was on exhibition throughout the two weeks of the Canadian National Fair. This bus has a seating capacity of 48 people—22 inside and 26 on the upper deck. The somewhat limited headroom, which has been remarked upon by many of those who inspected this bus, is essential on account of the numerous bridges and electric wires that have to be passed under on many of Toronto's streets.

The Commission has also purchased one bus from the Associated Equipment Company, of Walthamstow, England, and one from the Leyland Motors, Limited—a British firm with a branch in Toronto. An order has also been placed for one bus of the Fifth Avenue type with the Eastern Canada Motor Truck Co., of Hull, Quebec.



Motor Bus of the type being tried out on Toronto's suburban streets

Current News and Notes

Aurora, Ont.

Mr. Reg. R. Matson, Aurora, has been awarded the contract for electrical wiring on two \$30,000 bank buildings being erected in the towns of Aurora and Newmarket, Ont., for the Bank of Montreal.

Dixie, Que.

The Montreal Electric Co., Ltd., 94 St. Felix St., Montreal, Que., has secured the contract for electrical work on a \$450,000 club house being erected at Dixie, Quebec, for the Royal Montreal Golf Club.

Halifax, N.S.

Messrs. Arthur & Conn, Argyle St., Halifax, N.S., have been awarded the contract for electrical work on a storage building being erected on Hollis St., Halifax, at an approximate cost of \$175,000 for the Eastern Telephone Company, St. John, N.B.

The city council of Halifax, N.S., has voted in favor of taking over the hydro-electric plant being constructed at St. Margaret's Bay by the Nova Scotia Hydro-electric Commission.

Hamilton, Ont.

The Electric Supply Co., 65 James St. South, Hamilton, Ont., have been awarded the contract for electrical work on a sanatorium being erected for the Hamilton Health Association.

Laprairie, Que.

A new wireless station for the Marconi Wireless Telegraph Company of Canada, Ltd., will be erected at Laprairie, Que. A start is to be made at once preparatory to the erection of two 300-foot self-supporting steel towers near the King Edward highway.

Lauzon, Que.

The E. Laurie Co., 243 Bleury St., Montreal, were awarded the contract for a De Laval electric pump for use on the \$300,000 waterworks system nearing completion at Lauzon, Que.

Montreal, Que.

Messrs. Booth Bros., 316 Melrose Ave., Montreal, have been awarded the contract for electrical work on a gymnasium being erected for the Lower Canada College at an estimated cost of \$50,000.

North Bay, Ont.

Messrs. McCool & Stewart, North Bay, Ont., have secured the contract for electrical work on a \$15,000 store building recently erected on Main St., North Bay, for Mr. Phillip Adams, 28 Oak St.

Messrs. Dingle & Alger, North Bay, Ont., have been awarded the contract for electrical work on a school building recently erected on McPhail St., North Bay.

Ottawa, Ont.

Mr. J. Ladouceur, Eccles St., Ottawa, Ont., has been awarded the contract for electrical work on an addition being built to the Library on Metcalfe St., Ottawa, at an estimated cost of \$20,000.

Mr. S. J. Davis, 157 Pretoria St., Ottawa, Ont., has secured the contract for electrical work on a \$20,000 garage being erected on Albert St., Ottawa, for Drs. Graham & Graham, Clemow Avenue.

Outremont, Que.

Mr. J. Gauthier, 489 Orleans St., Outremont, Que., has secured the contract for electrical work on an apartment being erected at Querbes and Lajoie Sts., Outremont, for Mr. L. A. Desy, 1375 St. Viateur St., at an estimated cost of \$55,000.

Paisley, Ont.

A by-law authorizing the installation of a hydro-electric system for the town of Paisley, Ont., has been passed.

Peterborough, Ont.

Messrs. Beattie-McIntyre, Ltd., 72 Victoria St., Toronto, have been awarded the contract for electrical work on an addition being built to St. Joseph's Hospital, Peterborough, at an approximate cost of \$145,000.

Point Grey, B.C.

The Electric Shop, 12 Hastings St. East, Vancouver, has been awarded the contract for electrical work on the Kerrisdale School, Point Grey, B.C., that is being erected at an estimated cost of \$125,000.

Port Arthur, Ont.

A telephone system for the despatching of trains is being installed on the Canadian National Railway between Winnipeg and Port Arthur.

St. John, N.B.

The New Brunswick Power Company, St. John, N.B., is offering a reward of \$500 for the arrest and conviction of an unknown party who threw a stone through the window of one of their street cars recently.

The city of St. John, N.B., has been notified by the New Brunswick Power Company that the cost of street lighting has been increased by thirty-three and one-third per cent. The old rate was a flat one of \$36,000 a year. The increase brings it up to \$48,000.

St. Thomas, Ont.

The electric pumps installed last spring for the water supply of the city of St. Thomas, Ont., were recently put into service with satisfactory results.

Summerland, B.C.

Messrs. Atkins & Thornber, Summerland, B.C., have secured the contract for electrical work on a \$60,000 fruit storage warehouse being erected at Summerland for the Summerland Storage Co.

Toronto, Ont.

Mr. D. W. Harvey, formerly superintendent and engineer of the civic street railways, Toronto, has been appointed assistant manager of the Toronto Transportation Commission.

The Ontario Gazette announces the incorporation of Universal Electric, Limited, with a capital of \$80,000. The new firm will take over the electrical business formerly carried on by the Universal Electric Company, 689 Queen St. E., Toronto.

Vancouver, B.C.

Mr. W. W. Fraser, 602 Hastings St., Vancouver, B.C., has secured the contract for electrical work on a Masonic Temple at Seymour and Georgia Sts., Vancouver, which is undergoing alterations.

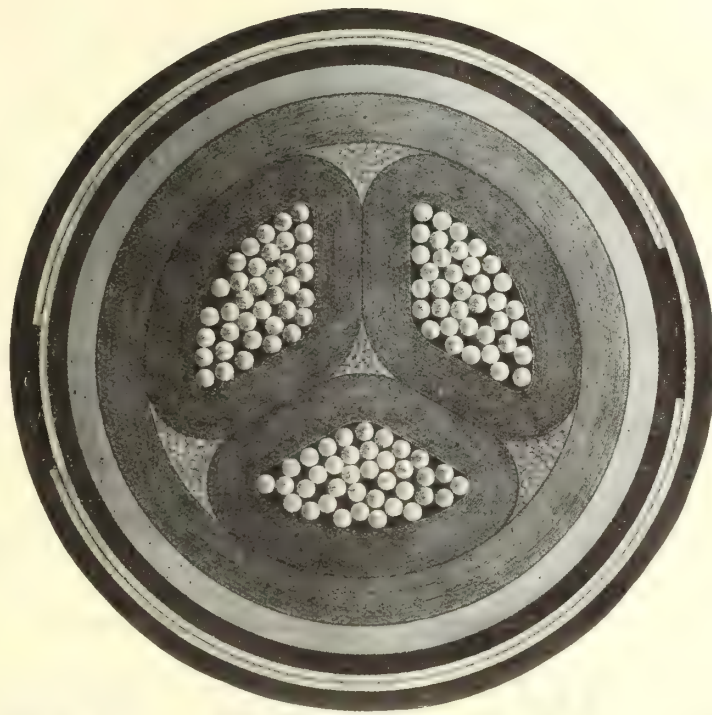
Vegreville, Alta.

The Hillas Electric Co., 10041 Jasper Avenue, Edmonton, Alta., has been awarded the contract for electrical work on a \$25,000 school recently erected at Vegreville, Alta.

Victoria, B.C.

The Murphy Electric Company, 602 Sayward Bldg., Victoria, B.C., has secured the contract for electrical work on the Work Point Barracks, Victoria, recently erected at an approximate cost of \$20,000. Also for a store recently erected on Yates St. for Messrs. McCandless Bros., 739 Queens Ave.

POWER CABLE



350,000 C. M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable

Overall Diameter—3.62 ins.

*Built to Specification of Hydro-Electric Power Commission
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YOUNG TECHNICAL GRADUATE, this year preferred, in engineering, from recognized University, wanted to enter a sales engineering office handling high class apparatus. Applicant must be capable of concentration on details and should be generally well informed. Good opportunity to learn the selling end of an interesting business with good prospects for advancement for the right man. Reply, stating full experience, age, and starting salary. Box 672, Electrical News, Toronto. 19

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Largest electrical and storage battery business in Northern Saskatchewan. Annual turnover \$80,000.00.

Apply 319, G. North,
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Almost new 150 k.w. General Electric Generator, 25 cycle, type A. T. B., 550 or 2,300 volts, 500 R.P.M., form B, class 5-150-500. Write Gray-Dort Motors, Chatham. 14-18

Construction Analyzed by United States Chamber of Commerce

In a special report issued June 17 by the committee on statistics and standards of the United States Chamber of Commerce the total national wealth of the United States is estimated at \$288,164,000,000, of which \$77,321,000,000, or 26.8 per cent., is represented by the construction industry. The report presents an analysis of the relationship of construction to the basic industries of the nation, including manufacturing, mining, transportation, agriculture, trade and finance, and concludes that construction as a key industry should be classified separately as one of the nation's basic industries.

The report shows that in 1914 one-quarter of the 276,000 manufacturing concerns employing 10,658,000 workers, with an annual payroll of \$5,368,294,000, and an annual output worth \$25,000,000,000, was devoted to construction products.

Highway Projects in Pennsylvania

The state highway department of Pennsylvania has completed approximately 160 miles of durable thoroughfare during the present season. During the week ending June 15, the department broke all previous records by completing 29.13 miles of highway in which concrete entered in some form. Its previous record was 27 miles in one week. So far during the 1921 season, nineteen road-building projects have been completed. These total 68 miles. A dozen other projects are rapidly nearing the completed stage.

On June 15 there were under way in

Pennsylvania 231 construction jobs. These involved a total length of 4,946,011 lin. ft., or 934.73 miles; and the total contract price is \$51,731,523.54.

MOTORS

	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used	1	100	3	25	550	710	Wagner
"	1	75	3	25	550	480	Westg.
"	1	60	3	25	550	750	Cr. Wh.
New	2	52	3	25	550	720	Lanc.
Used	1	50	3	60	550	970	Westg.
Used	2	50	3	25	550	720	Westg.
New	2	35	3	25	550	720	Westg.
Used	1	30	3	25	550	1500	Tor & Hm
"	2	30	3	25	550	750	F.M.
Used	1	25	3	25	550	750	C. G. E.
New	1	25	3	25	550	715	Lanc.
New	1	15	3	25	550	1450	Westg.
"	1	15	3	25	550	750	Lincoln
"	3	15	3	25	550	720	Westg.
New	2	13	3	25	550	700	Lanc.
Used	1	7½	3	25	220	1500	Tor & Hm
"	1	7½	3	25	550	1450	C.G.E.
New	1	7½	3	25	550	725	Westg.
Used	1	7½	3	25	550	700	Lanc.
New	1	5	3	25	550	1440	Excelsior
Used	1	5	3	60	200	1120	Westg.
New	3	3	3	25	550	1500	Lanc.
"	4	3	3	25	550	1400	Westg.
"	4	3	3	25	550	1400	Excelsior
Used	1	2	1	60	110	1750	Wagner
New	2	2	3	25	550	1500	Lanc.
New	2	2	3	25	550	1440	Excelsior
"	2	2	3	25	550	1425	Lanc.
New	1	2	1	25	110	1400	Wagner
"	1	1½	1	25	110	1420	Wagner
New	1	1	1	60	110	1725	Wagner
Used	1	1	3	25	220	1500	Tor & Hm
Used	1	1	1	25	110	1460	Wagner
New	1	1	1	25	110	1440	Wagner
"	1	1	3	25	550	1425	Lanc.
Used	1	1	3	25	220	710	C. G. E.

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Address

Date.....19

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- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
 - 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
 - 1 10 hp. C.W. 750 rev., starter, rails, pulley.
 - 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
- 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 - 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 - 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 - 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
- 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
 - 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
- 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
- 3 ½ hp. 1200 rev. clutch type T.H.E.
 - 1 1 hp. 1800 rev. split phase Peerless.
- NEW SINGLE PHASE MOTORS in STOCK—REPULSION
- 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1800 rev.
 - 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1800 rev.
 - 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1800 rev.
 - 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1800 rev.
 - 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1800 rev.
 - 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1800 rev.
 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 - 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE
- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 - 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
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Easy to apply—Simply dip into can and allow excess to drip back for two minutes, and wash off with water.

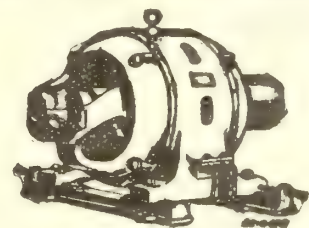
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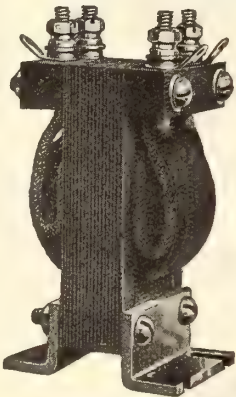
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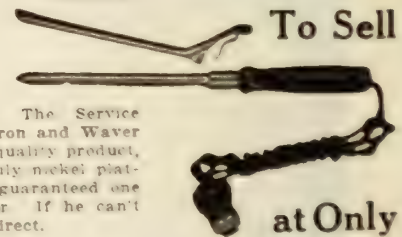
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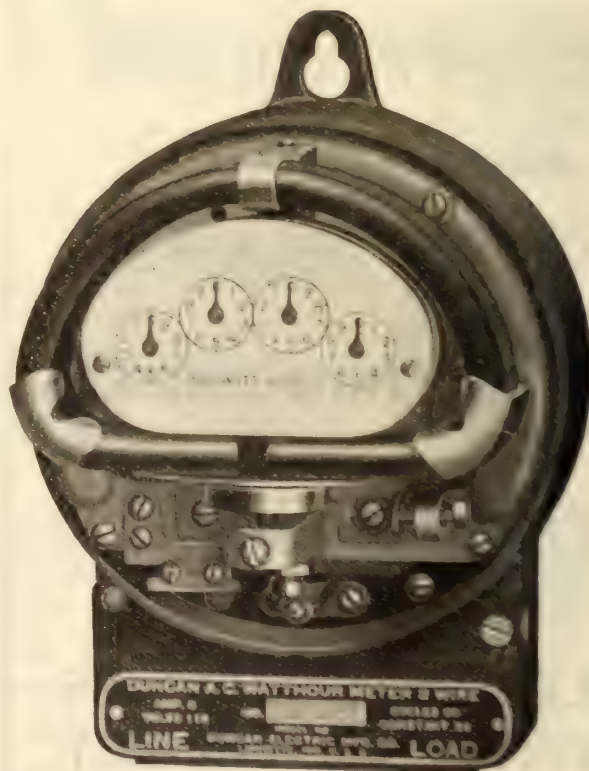
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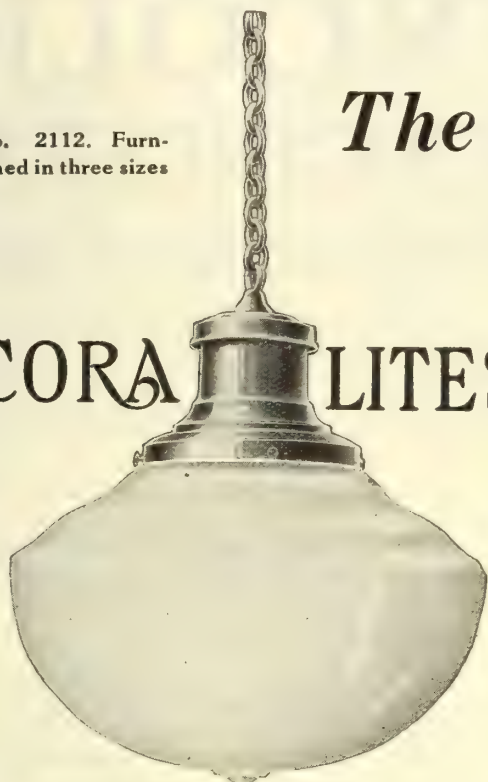


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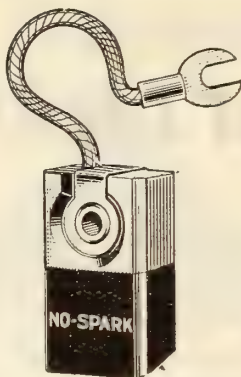
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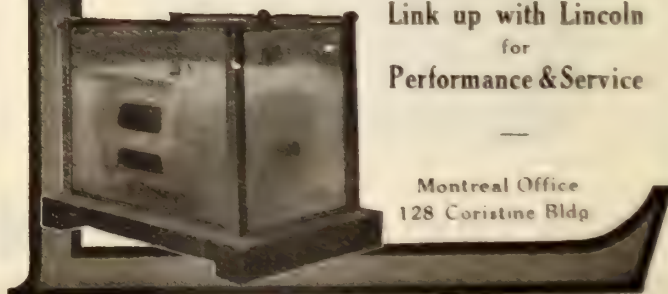
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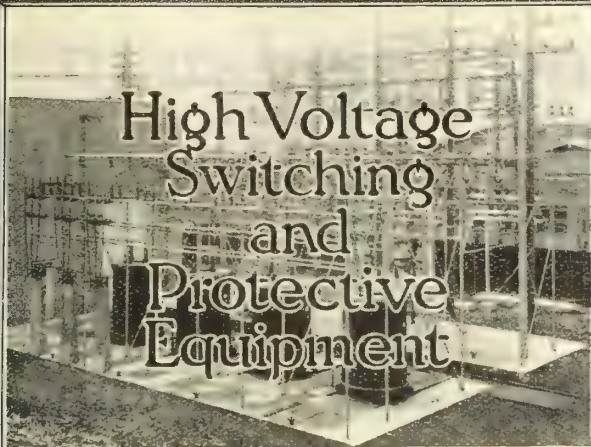
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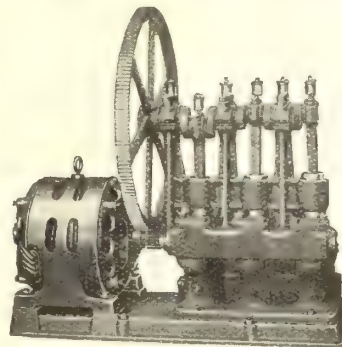
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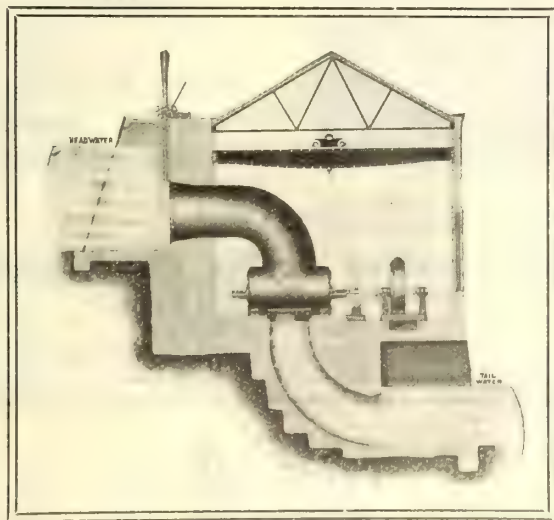
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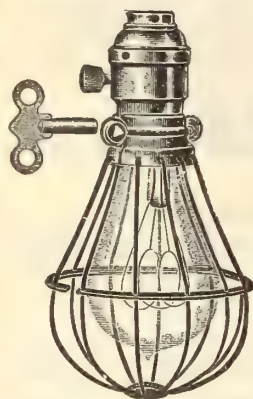
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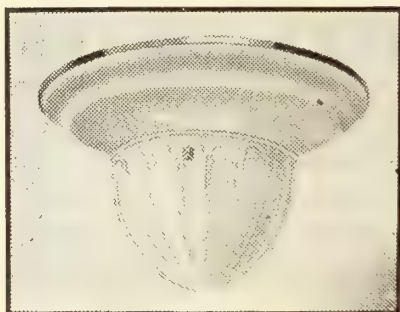
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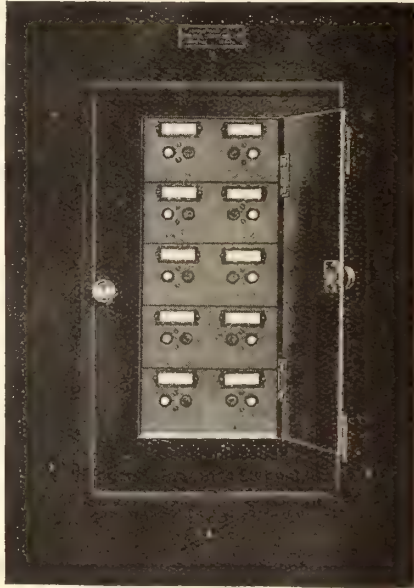
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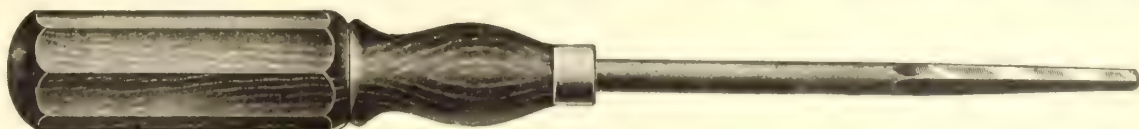
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Electric Motor & Machinery Co., Ltd.
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ELECTRIC SOLDERING IRONS
Clemens Electrical Corporation

ELECTRIC SWITCH BOXES
Canadian General Electric Co., Ltd.
Canadian Drill & Electric Box Company
Dominion Electric Box Co.

ELECTRICAL TESTING
Electrical Testing Laboratories, Inc.

ELEVATOR CONTRACTS
Dominion Carbon Brush Co.

ENGINES
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Canadian Allis-Chalmers Company

FANS
Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Century Electric Company
Great West Electric Company
McDonald & Willson
Northern Electric Company
Renfrew Electric Company
Robbins & Myers

FIBRE (Hard)
Canadian Johns-Manville Co.
Diamond State Fibre Co. of Canada, Ltd.

FIBRE (Vulcanized)
Diamond State Fibre Co. of Canada, Ltd.

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Canadian Hart Accumulator Company
Hatheway & Knott, Inc.
Northern Electric Company
Slater & Barnard

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Crown Electrical Mfg. Co., Ltd.
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Duquesne Electric & Mfg. Co.
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McDonald & Willson
Northern Electric Company
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Canadian Triangle Conduit Company
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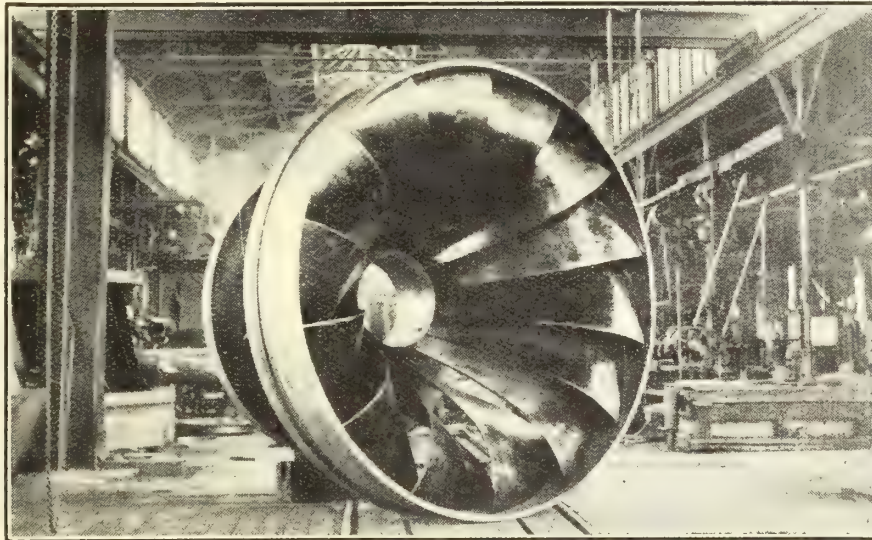
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Electrical Maintenance & Repairs Company
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Ferranti Meter & Transformer Mfg. Co.
Lancashire Dynamo & Motor Company
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Northern Electric Company
Thomson Company, Limited
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Jefferson Glass Company

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International Machinery & Supply Co.
McGill Manufacturing Company

HANGERS (Cable)
Standard Underground Cable Company of Canada, Limited

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Smith Company, S. Morgan

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Canadian General Electric Co., Ltd.
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Electrical Appliances, Ltd.
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Canadian Inspection and Testing Laboratories

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Moloney Electric Company of Canada
Mica Company of Canada
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HAMILTON - CANADA

*Manufacturers of High and Low
Tension Porcelain Insulators*

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No. 394

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Renfrew Electric Company

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Canadian Hart Accumulator Company
Canadian National Carbon Company
Exide Batteries of Canada, Ltd.
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Canadian General Electric Co., Ltd.
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Canadian Johns-Manville Co.
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Devoe Electric Switch Company
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Moloney Electric Company of Canada
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Paulding, John I.

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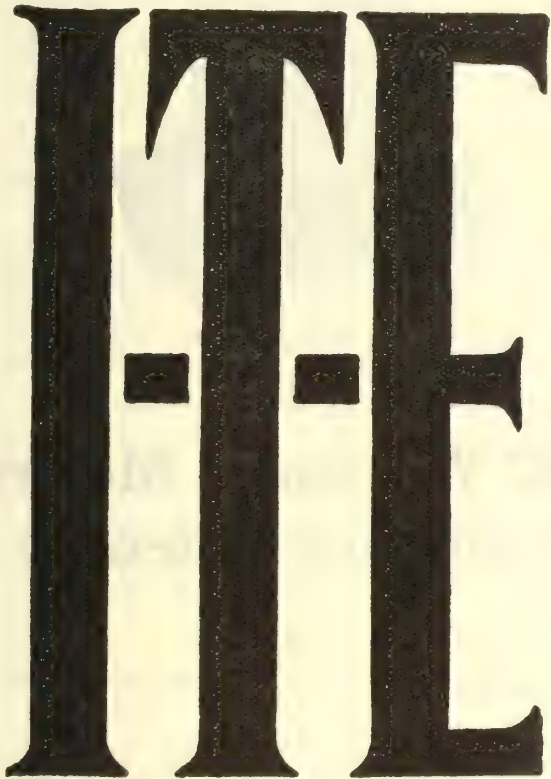
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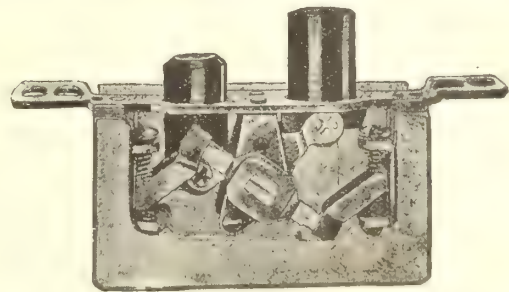
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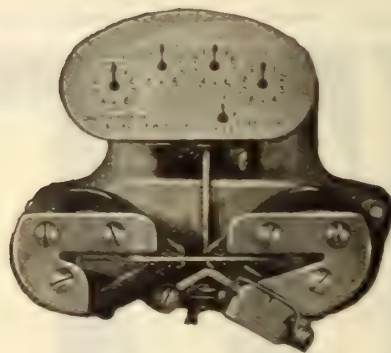
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Safeguard Your Earnings



Type CC Watthour Meter
with Glass Cover



Type CC Watthour Meter
with Metal Cover

**Use Westinghouse Type CC Watthour Meters
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They are pre-eminently adapted to give maximum possible accuracy, embodying as they do the following distinctive features:

- Rolling-Ball Bearings.
- Superior accuracy at light load and overload.
- Self-locking adjustment for full and light load.
- Light Moving Element.
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We have a Folder describing Type CC Watthour Meters in detail.

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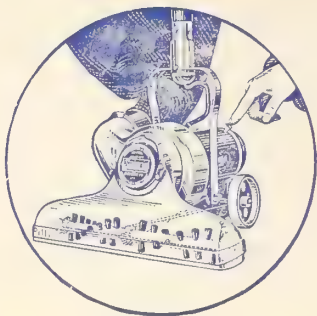
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This two-in-one cleaner sells itself in competition. Design, workmanship and the scientific principle of cleaning appeal to your prospective customers. Write us for information regarding this wonderful machine which increases your sales and profits.

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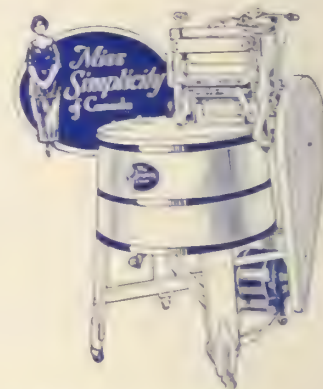
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The Electric Sweeper Vac.

is Two Cleaners in One

FIRST—Because it cleans by powerful suction plus a correctly speeded brush.

SECOND—Because it cleans by powerful suction alone.



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HAVE YOU BENEFITTED?



Experience of the last few years has been very rich in its teaching of the value of flexibility in a distribution system.

Now that you have the opportunity to revise, balance, and rebuild circuits that were badly overloaded, why not guard against fixed limitations by using G & W POT-HEADS AND BOXES, which can be the basis of the greatest possible flexibility, both of operation and layout.

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An exclusive feature of
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The advantages are :

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- Less Oil
- Lower Temperature Rise
- Greater Overload Capacity
- Stock Delivery on Standard Sizes
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of Communication*



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We have for years manufactured large quantities of this type of Telegraph Cable and to-day it is giving service in various sections of the country. We are always willing to manufacture special cable to meet a customer's requirements. We wish, however, to emphasize the fact that satisfaction results from the use of our standard designs, which are the result of long experience by our engineers.

**400 pair No. 22 B & S
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Lead-covered Telephone Cable for both Underground and Aerial Installation. The size illustrated is in great demand, as are also 600, 200, 100 and 50 pair cable. No. 22 B & S gauge conductors are supplied in cables for subscribers' lines, whereas No. 19 B & S and larger are employed in toll line cables. Composite Cables containing conductors of two or more different gauges are also made.



*Largest Canadian Manufacturers of
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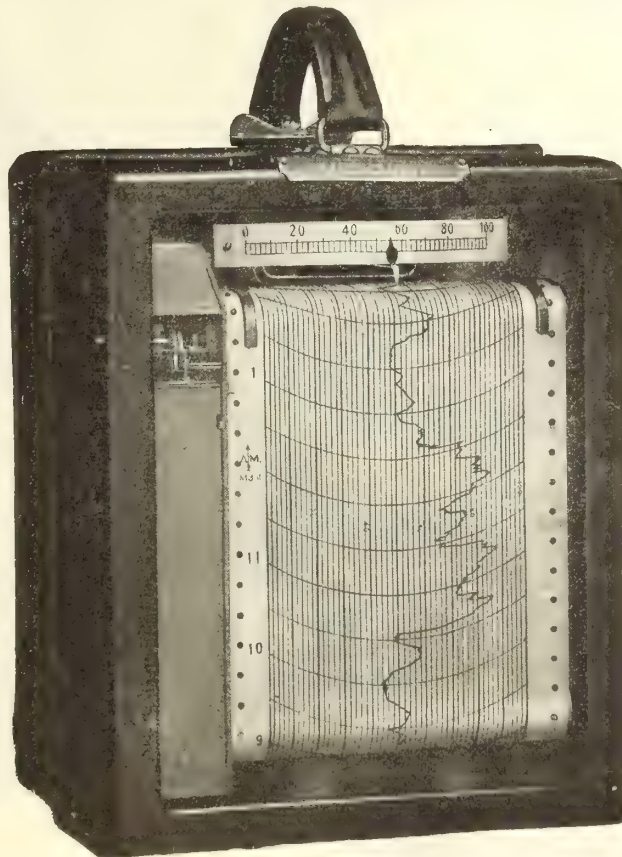
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**Graphic Wattmeters****Graphic Voltmeters****Graphic Power-Factor Meters**

Ideal for generating stations, substations, industrial and isolated plants where the value of a true load curve cannot be overestimated.

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ANOTHER BEAVERDUCT INSTALLATION

BEAVERDUCT has been adopted by the Toronto Transportation Commission for use on their new street cars. Once again, quality has fittingly demonstrated its ability to withstand competition.

Beaverduct is "Made in Canada" in a modern plant under the supervision of the best engineers available. Beaverduct is produced under the underwriters' inspection. Its use on such an installation as the new Toronto Street Cars is a fitting testimonial of its superiority.



Good conduit can only be produced in a plant where the equipment permits only absolutely clean material being used. Electrical apparatus and plating solutions must be kept up to the mark under scientific management. The proper application of the enamel, after the galvanizing of the outside, is of vital importance. And, lastly, rigid inspection.

*Always specify
"Beaverduct"*

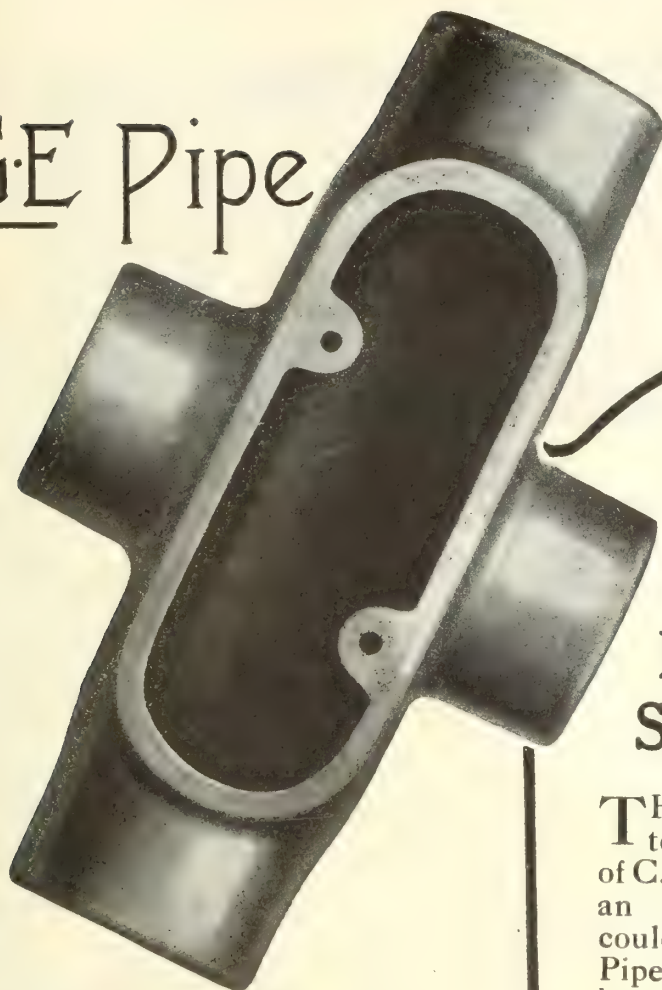
Canadian General Electric Co., Limited

HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

C.G.E. Pipe

Fittings



Used on the New Toronto Street Cars

THE above fact is just one more testimonial of the superiority of C.G.E. Pipe Fittings. On such an installation as this, nothing could be left to chance. Only Pipe Fittings of tested worth could be considered.

When it is taken into consideration that there are ten separate and distinct inspections that C.G.E. Pipe Fittings must pass before they are allowed to be put into stock, it is no wonder that these Fittings have such an enviable reputation.

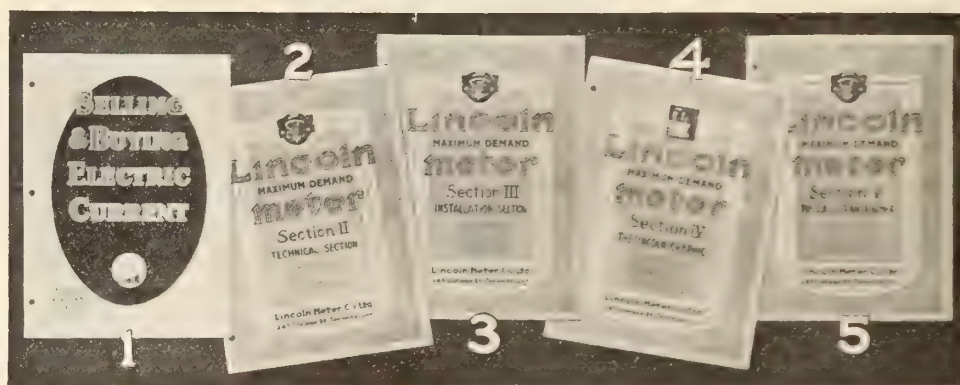
The above features are worth serious consideration when next you order Pipe Fittings.

C.G.E. Pipe Fittings are "Made in Canada"

Canadian General Electric Co., Limited

HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.



Have You Sent for Your Copy of the Lincoln Demand Meter Catalog?

If you haven't, this is a second request that you do so at your earliest convenience.

Whether you contemplate installing Lincoln Meters or not, you will be interested in the up-to-the-minute discussions of rate making. You will want to read why accurate demand measurement should enter into a customer's bill—how it insures satisfaction to both central stations and customers.

1. **SECTION I.—Commercial.** Subjects discussed: Non-technical, simple reasons for using the Lincoln Meter from a money standpoint, primarily; simplified study of rate making; how largest part of bills are now estimated; how Lincoln Meters put billing on measured basis; and what some users say.

2. **SECTION II.—Technical.** Subjects discussed: Technical reasons for use of the Lincoln, principle of operation, and how it measures, how it is made, how it is adjusted, the anti-vibration device, capacities, etc.

3. **SECTION III.—Installation.** Subjects discussed: Descriptive of mechanical parts, connection and dimension diagrams; testing diagrams and charts; transformer details; and ordering information.

4. **SECTION IV.—The Lincoln Graphic.** Subjects discussed: Similarity of Indicating and Graphic types; comparisons of two types of loads and reasons for the Lincoln Graphic; comparisons of various graphic meters; comparisons of actual charts; and description of meter.

5. **SECTION V.—The V A D Transformer.** Subjects discussed: Equitable distribution of fixed charges by the measurement of volt amperes rather than watts; phase shifting transformer, its design, construction and operation; vector diagrams of voltages involved in volt ampere demand measurement.



Hand now on left varies with load and shows this load at any time of day.

Hand now on right moves only to right and indicates maximum load since last resetting.

The Lincoln Meter Co., Limited

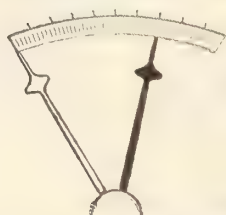
243 College Street, Toronto, Canada

Cable "Meters" Toronto Phone College 1374

Lincoln

MAXIMUM DEMAND

meter

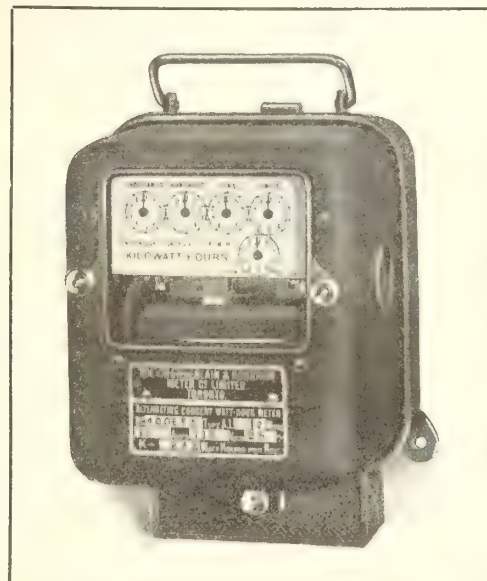


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World

USED ELECTRIC MOTORS

IN STOCK APRIL 24th

550 Volts 3 Phase 60 Cycle			
1 H.P.	1800 RPM.	Westg.	
3 "	1800 "	C.-Wheeler	
5 "	1800 "	A.C.B.	
5 "	1200 "	C.G.E.	
5 "	900 "	C.-Wheeler	
7½ "	1800 "	Thomson	
7½ "	1800 "	C.-Wheeler	
7½ "	1200 "	Thomson	
7½ "	1200 "	Ampere	
7½ "	900 "	Westg.	
10 "	1800 "	C.G.E.	
10 "	900 "	C.-Wheeler	
15 "	1200 "	C.G.E.	

ALTERNATING CURRENT			
15 "	1200 "	A.C.B.	
20 "	1200 "	A.C.B.	
20 "	1200 "	C.-Wheeler	
25 "	1200 "	Westg.	
25 "	900 "	C.G.E.	
30 "	900 "	Fairbanks	

550 Volts 3 Phase 60 Cycles			
35 H.P.	900 RPM.	C.-Wheeler	
50 "	900 "	A.C.B.	
50 "	900 "	Westg.	
75 "	900 "	Westg.	
100 "	900 "	C.G.E.	
300 "	720 "	Westg.	

220 Volts 3 Phase, 60 Cycle			
5 H.P.	1800 RPM.	Watson	
7½ "	1800 "	A.C.B.	
10 "	1200 "	S.G.E.	
10 "	900 "	A.C.B.	
75 "	900 "	Westg.	
75 "	720 "	Westg.	
100 "	720 "	Fairbanks	

2200 Volts 3 Phase 60 Cycle			
50 H.P.	1200 RPM.	A.C.B.	
100 "	720 "	C.G.E.	
200 "	514 "	C.-Wheeler	

1—75 K.W. 2300 volts 60 cycles 3 phase 900 rpm. G.E. revolving field type generator.
1—250 K.W. 600 volt 60 cycle 2 phase 600 rpm. C.G.E. revolving field type generator

TRANSFORMERS

3—15 K.V.A. 2200-550 volts 60 cycle C.G.E.
2—30 K.V.A. 2200-220/110 volts 60 cycle Wagner
2—200 K.V.A. 2200-220/110 volts 60 cycle Packard

DIRECT CURRENT MOTORS AND GENERATORS

110 VOLTS			
6 H.P.	1850 RPM.	C.G.E.	
6 KW.	1465 "	Westg.	
8 H.P.	1200 "	Union	
10 "	700 "	G.E.	
11 "	700 "	Westg.	

220 VOLTS			
20 H.P.	925 RPM.	C.G.E.	
50 "	950 "	Westg.	
90 "	925 "	Westg.	
100 "	650 "	Bullock	

500 VOLTS			
10 H.P.	1000 RPM.	A.C.B.	
10 "	1400 "	C.G.E.	
20 "	1000 "	Western	
25 "	950 "	Westg.	
50 "	825 "	Westg.	
60 "	900 "	Westg.	

All the above thoroughly overhauled, in first class condition and guaranteed.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL



“Erie” Fittings

10,000 COMBINATIONS

The name “ERIE” is attracting world-wide attention in the field of electrical pipeframe construction because ERIE Fittings embody

Simplicity in design

Adaptability to use

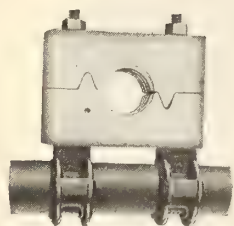
Superiority over all former types

The **MODERN** and **PRACTICAL FITTINGS**

The **Savers** of **Time, Labor and Money.**

Don't forget “ERIE” is their name

Catalogue on request



ERIE ELECTRICAL EQUIPMENT COMPANY, Inc.

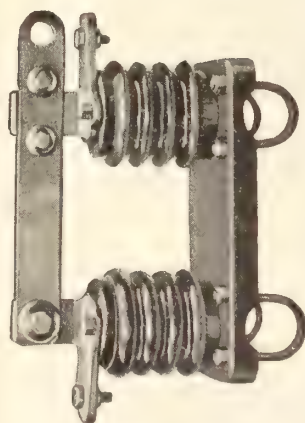
Main Office and Factory JOHNSTOWN, PA.

Offices in all principal cities

Canadian offices 414 St. James St., Montreal.



The Ultimate Switch—



Indoor Type

The “Three E” Disconnect Switch is the “last word” in switch construction. Its design is a radical departure from existing types. The patented blade and clip construction of our switch cannot be imitated, consequently no other switch can be like a “Three E”. From a standpoint of perfect contacting and cool operation,

IT IS THE 100% SWITCH

If you are interested in application, operation or purchase of Disconnecting Switches either for station or line work it will pay you to get acquainted with us.



Outdoor Type Vertical Mounting

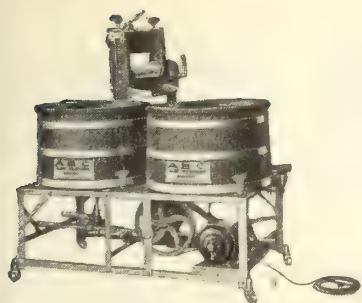


Made in various ampere capacities and for voltages up to 150,000

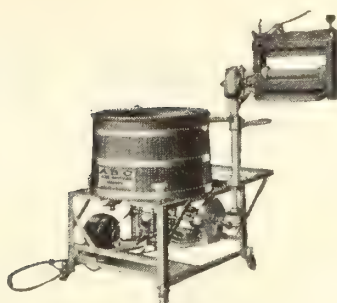
Electrical Engineers Equipment Co.

35 S. Desplains St., CHICAGO, U. S. A.

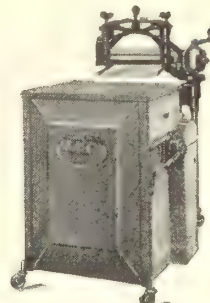
Northern Electric Company Canadian Representatives
LIMITED



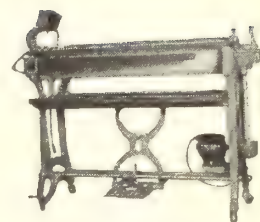
Twin tub
"Alco"
(Pegs or discs)



Single tub
"Alco"
(Pegs or discs)



A B C
Super Electric
(4 Models)



A B C
Electric Ironer
(with Motor)

A Washer to Suit every Purse

—and an Ironer to Match!

The one dependable quality line that is on a solid footing in the home laundry equipment field, the one line that includes a washer in every price class together with an electric ironer which the washers will operate—is the A B C.

Thirteen years of success in the business have served to complete and to perfect this famous line. It is a permanent asset to a dealer, a line he can build upon for the future.

It is a line which appeals to appliance dealers of high standing, dealers who sell nothing but appliances that they know will give satisfaction.

If you, too, believe in this policy, if you want your customers to remain satisfied and to recommend you to their friends, investigate the A B C line.

Write for our exclusive dealer proposition.

C. D. Henderson - **Canadian Representative**
Box No. 123, Brantford, Ont.

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MARITIME PROVINCES

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Masco Co., Ltd.,

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QUEBEC

Dawson & Co., Ltd.,

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SASKATCHEWAN

Sun Electrical Supply, Ltd.,
Regina

BRITISH COLUMBIA

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Vancouver

A B C *Electric Laundress*
WASHES **WRINGS** **IRONS**

What You Should Know About Devoe

Our Switchboard Department is most up-to-date.

We can build Switchboards of any size or voltage.

Our Panels and Switchboards have been installed in the following buildings:-

New Extension to the King Edward Hotel, Toronto, Ont.

Royal Bank, King and Yonge Sts. : Toronto, Ont.

New Union Station : : Toronto, Ont.

Shea's Hippodrome : : Toronto, Ont.

and in most of the largest buildings throughout Canada.

The Devoe Electric Switch Company

414 Notre Dame Street West, MONTREAL, Que.

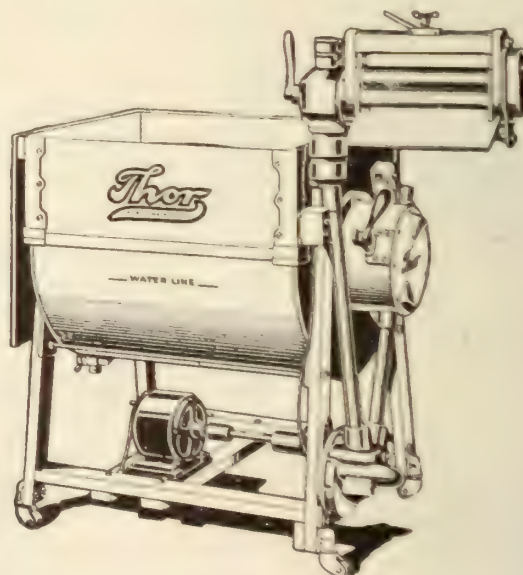
105 Victoria Street, TORONTO, Ont.

Thor

Electrical Dealers:

Think what it means to be able to say to
to your prospects,

"Over 600,000 women are using this
washing machine."



Hurley Machine Co., Ltd.

Ryrie Bldg.

TORONTO, CANADA

Galvaduct



A Galvaduct Building

The Jackson Building, Ottawa

George C. Graves Construction Co., Builder

Albert Ewart, Architect; Canadian Comstock Co., Electrical Contractor

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Loricated

Always specify GALVADUCT or LORICATED CONDUITS

If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

Moloney Transformers

RELIABLE AND EFFICIENT



Reliability under the severest conditions has always been one of the most desirable features of MOLONEY Transformers. That they are also efficient and give long service is proved by their ever increasing use from coast to coast. Let us send you full particulars.

MADE IN CANADA

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Port Street, Winnipeg.

District Offices

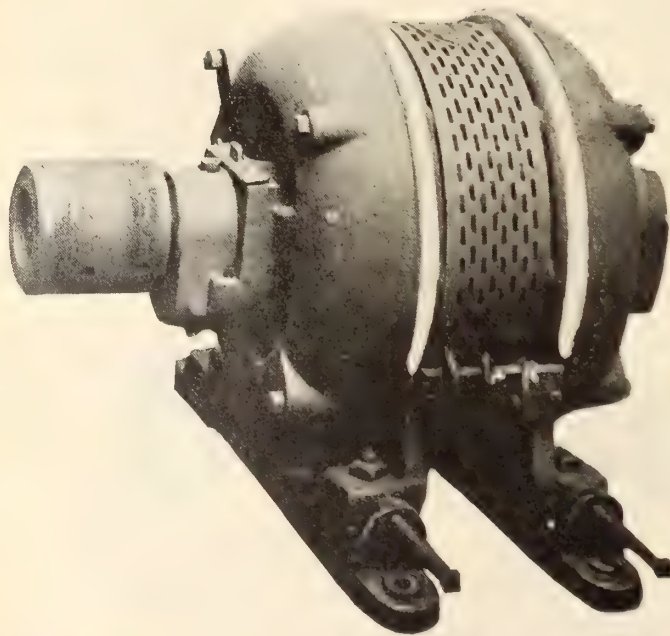
Montreal and Halifax

Factory

Windsor, Ont.

Head Sales Office

1221-2 Bank of Hamilton B dg., Toronto



"GOLD BAND" INDUCTION MOTORS

Manufacturing: from 1 to 100 H. P.

Equipping: for 10 to 100 H. P.

These motors will render the most efficient kind of service—long, uninterrupted service, free from repair bills and costly breakdowns. The kind that proves a motor's worth.

It all comes from the quality of materials used, the faultless workmanship and the scientific design of the motor.

Before you "fall" for the imported variety just give the "Gold Band" your expert consideration.

Write for list of used motors carried in stock

Special Offer In Used Motors:

5-2½ H. P. Kimble Motors 110V.
60-35 Cy. Variable speed 550 to
2200 R.P.M., Style A.D.J.

Marchand Electrical Works Limited

U. A. Leduc

55 COTE ST.

J. E. Lamothe

Phone Pl. 665-843

MONTREAL

Great West Electric Co.

LIMITED

MOFFAT RANGES : EDEN WASHERS

Electrical Supplies

GOODS SHIPPED SAME DAY ORDER RECEIVED

61-63-65 Albert St. WINNIPEG



THE NEW LINCOLN LINE OF “FIXTURES”

No. 32 Candle Bracket finished in Grey and Gold for immediate delivery.

Have you had a sample of same?
If not, send your order at once.

Dealers' prices in dozen lots—

No. 32 Candle	\$1.25
No. 32 Drop	\$1.00

Above prices do not include wire, sockets or lamps

Canadian Electrical Supply Co., Ltd.

Branch:
28 St. Joseph St., Quebec, Que.

165 Craig St. West, Montreal

Don't order just "Loom"—

Specify **"TRIDUCT"**

When you require "Armored Cable"—

Specify **"TRICABLE"**

Stocked by the Better Jobbers.

Selling Agents

Conduits Company Limited

33 Labatt Ave.

Toronto

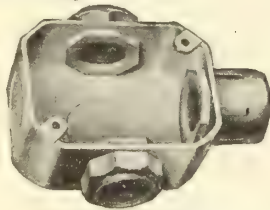
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

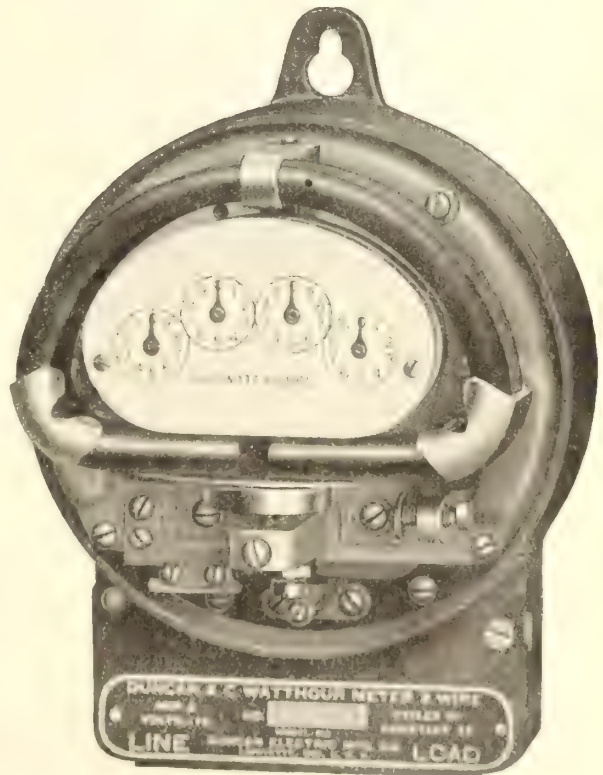
DUNCAN MODEL M2

FOR ALTERNATING CURRENT SERVICE

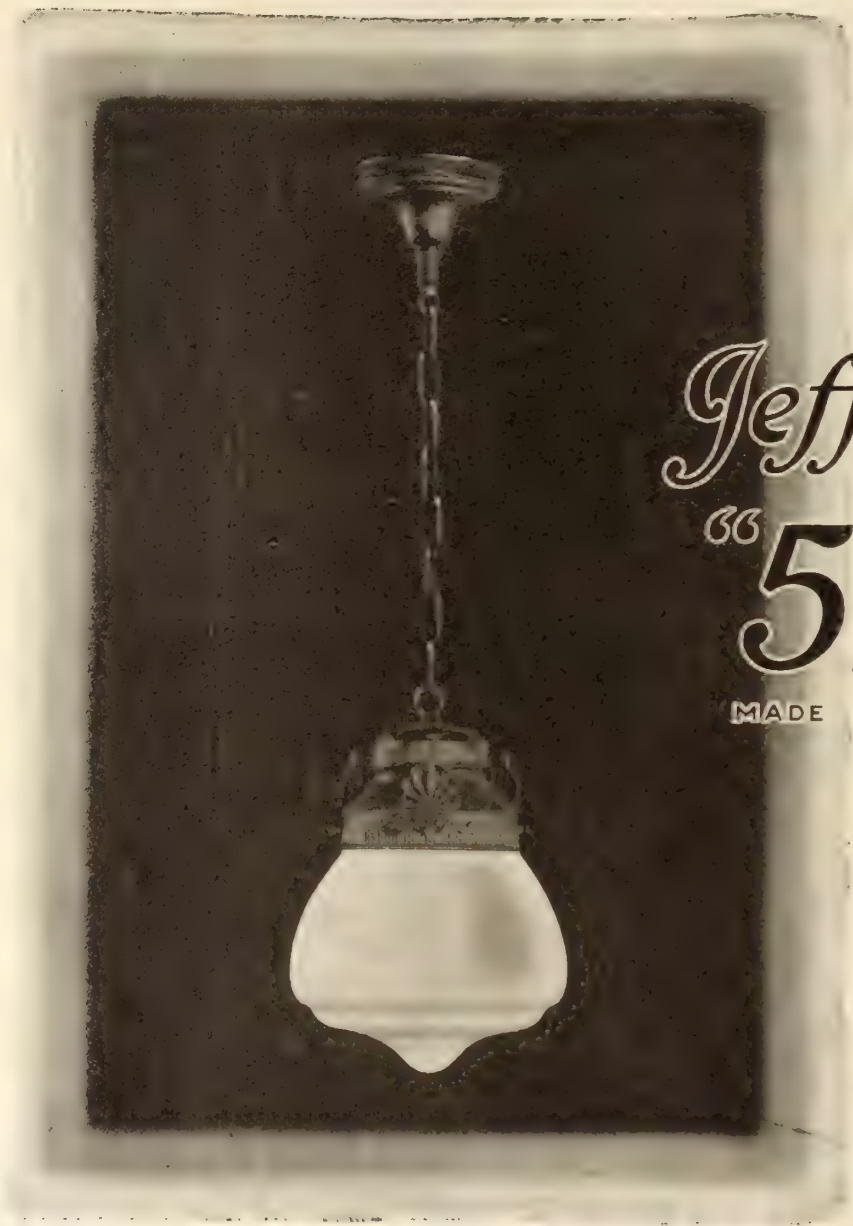
SUPERIORITY

of construction has always been looked upon by Duncan engineers as one of the prime requisites in meter development, and this ideal is characteristically manifested in the Model M2. Its every detail towards perfection has been worked out to a degree of precision hitherto unobserved.

No other meter in use today shows the degree of accuracy on overloads as does the Duncan Model M2. Test this out for yourself. Its magnet is so satisfactory and dependable that it is looked upon as opening up a new era of design for permanency.



THE GEORGE C. ROUGH SALES CORP'N. 131 CORISTINE BLD'G
MONTREAL



Jefferson
 "515"

MADE IN CANADA

WE SELL THE GLASSWARE ONLY

A PLEASING DEVIATION FROM THE BALL GLOBE

This unit has a very efficient lighting curve, besides its symmetrical lines. Made from Lumo Glass, with standard 6 inch fitter. Adaptable for any business lighting.

GET ON THE "515" AND CREATE NEW BUSINESS

Ask for our New Booklet of Commercial Lighting Units

THE JEFFERSON GLASS COMPANY, LIMITED

Head Office and Factory: 388 Carlaw Avenue, Toronto

Showrooms: 164 Bay Street, Toronto
 272 Main Street, Winnipeg

285 Beaver Hall Hill, Montreal
 510 Hastings Street W., Vancouver



Sell the "Baetz Line"

The "Baetz Line" of Portable Electric Lamps and Silk Lamp Shades gives you a wide range of designs and a wonderful opportunity for big sales.

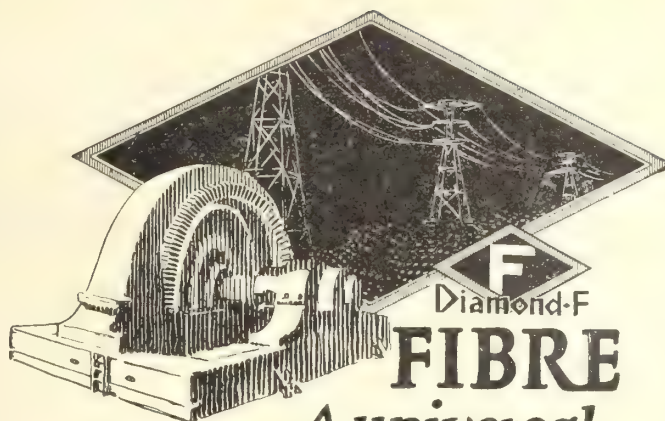
You'll like them—so will your customers. To show them is to sell them.

Write for Prices.

Baetz Bros. Specialty Co.
Limited

Kitchener

Ontario



*A universal
electrical material*

The actual demands made upon electrical equipment are usually greater than the estimated requirements. For this reason the material used for either insulation or equipment building must possess powers in reserve.

Diamond Fibre gives the "factor of safety" because it **has** these powers. It is not merely a dielectric—it is a high dielectric plus. To extreme non-conductivity it adds the great strength and extreme toughness so essential to longevity and exacting service. It has a range of utility which extends from the simplest forms of electrical insulation up to the most intricate of machined parts.

CONDENSITE CELORON

Where extremely high waterproof qualities are essential or for delicate radio and wireless work we recommend Condensite Celoron, a waterproof vulcanized fabric.

Diamond Fibre and Condensite Celoron are supplied in sheets, rods and tubes convenient for all manufacturing purposes or we can machine to specification if desired.

Write for fuller particulars.

Diamond State Fibre Company
of Canada Limited

Head Office and Works

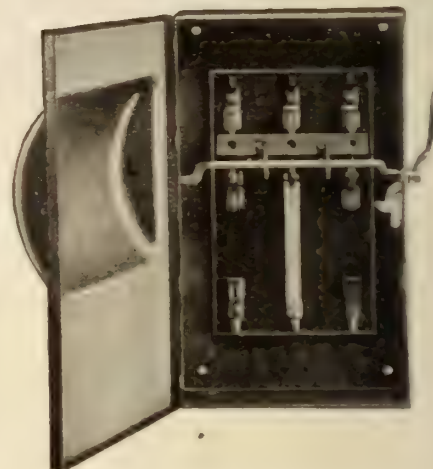
235 Carlaw Ave., Toronto, Canada



Externally Operated Switches



Langley's Externally Operated Switches are the product of a factory which for 10 years has been manufacturing steel cabinets and cut out boxes for the electric trade.



Langley Electrical Manufacturing Co. Limited

WINNIPEG

MANITOBA

Simplex Electric Heating Pad No 685



SPECIFICATIONS

Type No. 685.
Voltages 100-125, 200-250.
Watts 50.
Three Heats.
Size 12 x 15 in.
Shipping Weight 3 lbs.
Retail Price \$15.00

The Simplex pad is a light, soft, woolly eiderdown blanket, 15 inches long and 12 inches wide. It is the only means of providing a really effective Hot Application and one that maintains a constant, unvarying heat on the parts affected. The three heat feed through switch enables the pad to be kept as hot as wanted. The temperature of the pad is controlled by thermostats which prevent the pad from overheating.

Flexible:—It fits itself naturally to any part of the body.

Light:—It gives no oppressive sense of weight.

Convenient:—Simply attach plug; no hot water to bother with.

Indispensable:—There is no worse predicament than to be without it when you need it away from home. It takes little space in the travelling case.

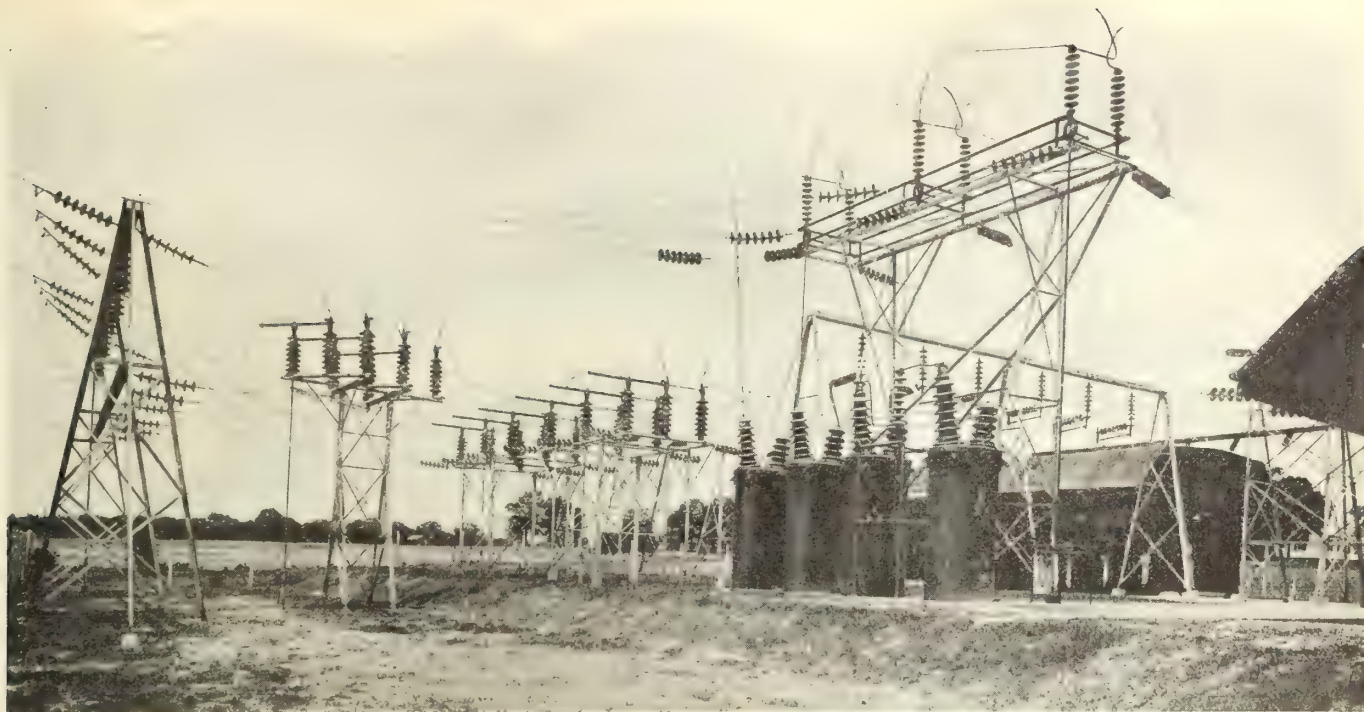
Moist applications, such as poultices and compresses, can be kept warm by using a rubber case.

"OTHER SIMPLEX PRODUCTS"

Toasters, Flat Irons, Stoves, Ranges, Soldering Irons, Heater Cords, etc.

Gelinas & Pennock Reg'd MONTREAL, Canada
207 St. James St.,

Eastern Representatives: SIMPLEX ELECTRIC HEATING COMPANY



Even the Smallest Mechanical Details Are Right in O-B *MODERNIZED INSULATORS*



A western Utility uses a revolving switch which requires six post insulators—all in perfect horizontal alinement. Recently the company ordered its first batch of O-B Insulators for this service and when installation time came got out the usual assortment of shims and wedges.

Much to the engineer's surprise and gratification every O-B Insulator fitted into the layout without a bit of juggling or a single shim.

When exact dimensions are specified O-B Insulators meet them. Of course, these details are not the paramount consideration. But when the mechanical strength and electrical reliability is assured—as in O-B Insulators—absolute fidelity to design requirements is a very desirable feature in the restricted space and complicated layouts of station construction.

So many stations have been equipped with O-B Insulators that you probably will find what you need in the wide variety of designs. If not, you will discover elaborate facilities in the O-B factory for producing special shapes.

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

Products: High Tension Porcelain Insulators; Trolley Material; Rail Bonds; Electric Railway Car Equipment; Third Rail Insulators.

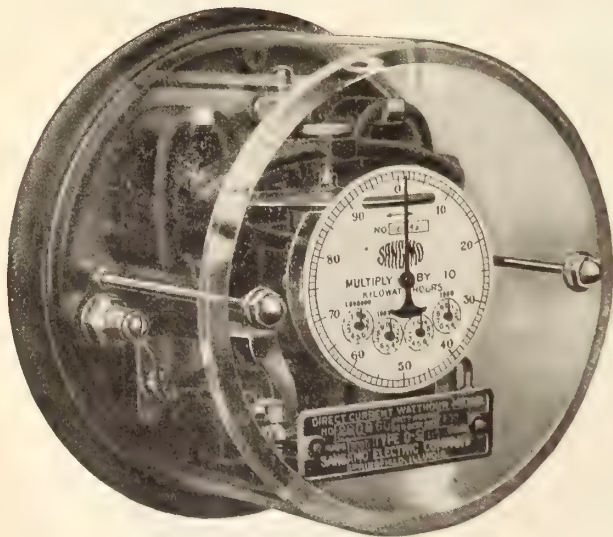
What Watthour Meters Will do for You

Economy to-day is absolutely essential in manufacturing. An efficient cost system is the best safeguard against waste of any kind. Electric current is just one of the many things that enter into a cost system, but at the same time is one of the most important.

Efficient Watthour meters installed on every feeder circuit or placed at proper points

WILL

- 1—Enable you to make the correct distribution of current used. (Very often the actual amount of power used is entirely different from the estimated amount.)
- 2—On account of the above enable you to determine your costs more accurately.
- 3—Immediately show up wasteful machines (or men) which could be checked up in no other way.



Sangamo Type D-5 Watthour Meter
(Switchboard Type)



Sangamo Type H Watthour Meter with
Metal Cover (Service Type)

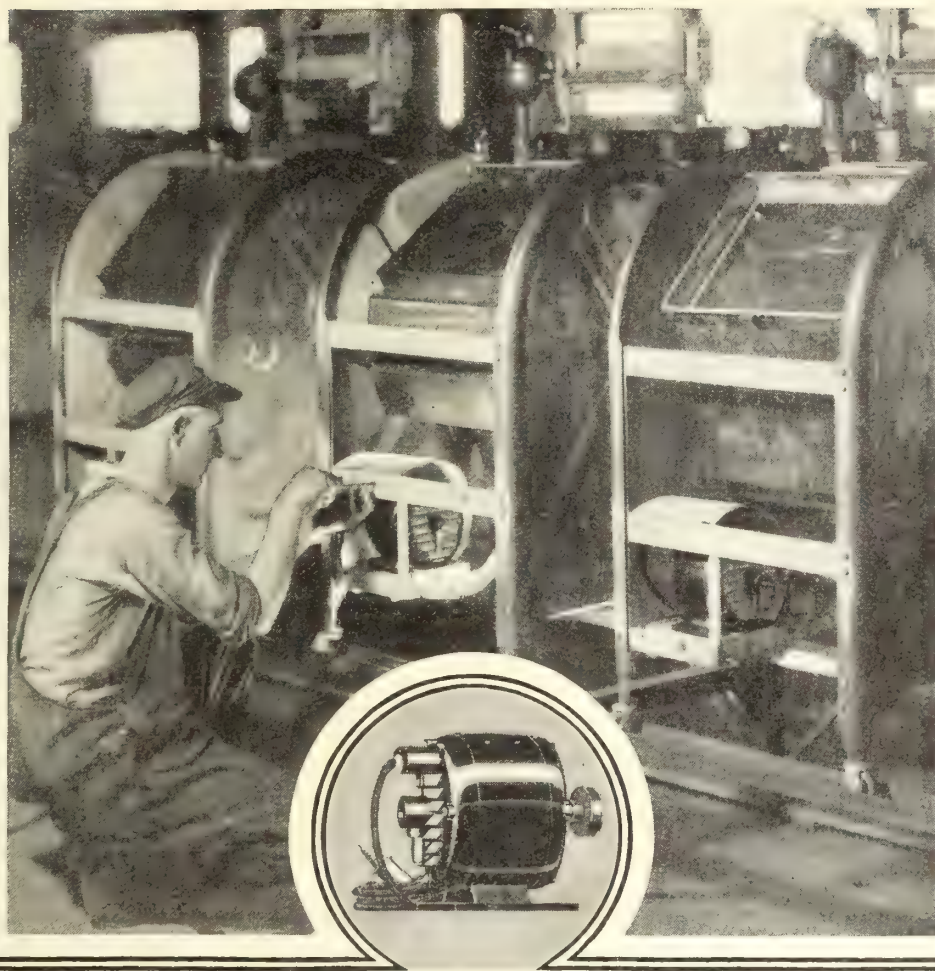


YOU can not do better than to install Sangamo Watthour Meters, the standard of many industries. Remember that there is a Sangamo for every metering purpose. A line from you brings full information. Ask for Bulletin 55C.

Sangamo Electric Company
of Canada, Limited

Factory: TORONTO

Head Sales Office: MONTREAL



Mounting R. & M. Motors on Washing Machines in Factory of Apex Appliance Co., Chicago

MANUFACTURERS of washing machines, vacuum cleaners and other electrical appliances for the home, office, store and factory, in ever-increasing numbers, recognize the R & M motor as the best guarantee of dependable service for their machines.

Over thirty of the leading washing machine manufacturers and three hundred manufacturers of appliances of all kinds supply R & M motors as standard equipment on their devices.

Distributors and dealers find that the R & M motor is also a help in their business, not alone because it insures satisfied customers for them, but also because years of consistent advertising have taught the public that the R & M equipped appliance is one which can be depended upon.

The R & M motor is a quality mark which reduces sales resistance all along the line from the manufacturer to the user of electrical appliances.

**The Robbins & Myers Company of
Canada, Limited**
Brantford, Ontario

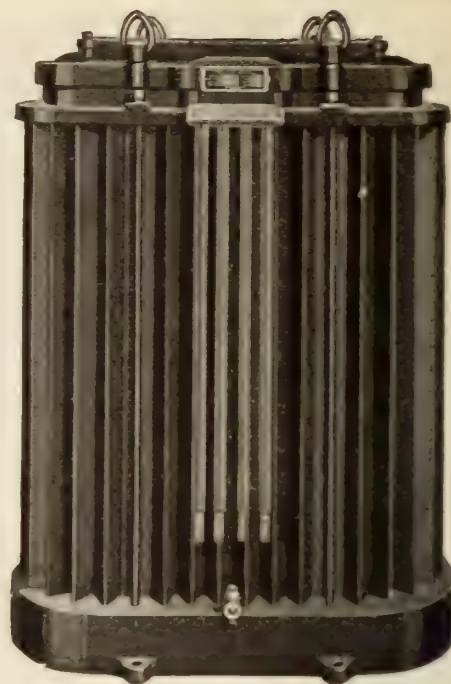
Robbins & Myers Motors

FERRANTI

Transformers



Series street lighting Transformer adapted for laying in the ground at foot of Lighting Standard. Primary circuit is taken in one end and out the other end with the two secondary leads together at one end through wiping sleeves of tinned brass tube.



FERRANTI 100 K.V.A. Outdoor Type Transformer in Corrugated Sheet Steel Case

Ferranti Meter and Transformer Mfg. Co., Limited

Toronto Montreal Winnipeg Halifax Timmins Calgary

Write to Our Nearest Office. Bulletins, Prices and Information on request.

HIGH

"ELPECO" LINES

TENSION

Ammeter Switches

Bus Bar Clamps

Bus Supports

(For Indoor and Outdoor Service)

Choke Coils

(For Indoor and Outdoor Service)

Control Switches

(Remote Control)

Copper Fittings

(Cast and Tube)



Disconnecting Switches

(For Indoor and Outdoor Service)

Insulator Pins

Outdoor Sub-Stations

Pole Top Switches

Power Factor Switches

Special Fittings

Switchboard Structural Devices and Fittings

Switchboards

(A. C. and D. C.)

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Toronto, October 15, 1921

No. 20

The Weakness of Municipal Ownership

The Canadian Manufacturers' Association, Toronto Branch, have performed a real civic service in bringing to the attention of the rate-payers the fact that the taxes, per capita, in the city of Toronto are far too high—more, for example than twice what they are in Montreal. They point out, also, that as things are going, there is a likelihood of an increased rate next year. This is bitter medicine for the ratepayers, but they have brought this physical condition upon themselves by their carelessness and indifference.

The carelessness is evident in the that year after year they have appointed to positions of trust men who were eminently unfitted to perform the duties assigned to them; men who think more of re-election than they do of the city's interests and who are always watching for an opportunity to take advantage of this or that civic development to make themselves "solid" with the electorate. These men follow the line of least resistance—make promises impossible of fulfilment offering people what they want, regardless of whether there is any justice in their demands.

A case in point is the recent attitude of the mayor in connection with the street railway fares. The mayor was aware that for a number of years the municipal railways in the city of Toronto had been operating at a loss. He knew, also that the Act under which the Toronto railway system was to be taken over on September 1 and operated

by a Commission, required that the system pay its own way. He knew that in other cities, the size of Toronto, fares were being charged practically identical with those announced by the Transportation Commission. He knew, also, that the Transportation Commission had made a careful study of the revenue and the cost of operation and were in a better position than anyone else to say what the fare must be. Yet, knowing these things, and without any specific information himself as to actual operating figures, he took the attitude that the fares must not be over so much—thus laying a direct charge upon the tax payers of the city. He did all these things knowing that the tax rate of the city under his administration had already increased until, as noted above, the taxes per capita, are more than twice that of the city of Montreal—the only other Canadian city comparable in population with Toronto.

* * *

This is the weakness of municipal ownership in Toronto. The people own the Utilities, of course, and when the people are led by a demagogue whose views are neither honest or sound, they are easily led to expect and demand things which, under a properly financed utility it is impossible to grant. However firm the management of such utilities may be; however indifferent to political influence; however unmoved by the hostile attitude of this or that section of the press, it, nevertheless, is an utter impossibility that opposition of this nature should not diminish the efficiency of any utility's operations.

The city of Toronto to-day seems to be an example of a combination of municipal ownership with high taxation. It is not fair to say that the high taxes are due to municipal ownership but we believe it is well within the mark to claim that the heavy load of taxes is the result, in no small measure, of the action of the city's executive officers during the past few years in interjecting politics into every single municipal operation where it was possible to find a toe hold for it.

* * *

Public ownership has been wonderfully popular in the province of Ontario, and particularly so in the city of Toronto, but the time has come when it will have to stand the test of close examination. The hue and cry that brought it into popularity can no longer keep it there unless it measures up to the standard of everyday business. We must be honest with the people. It is not fair to shout from the platform that we have saved them this or that in the way of rates, or in the matter of efficiencies, unless we also show them the other side of the balance sheet. As we have pointed out in these pages before, it looks as if Toronto had made a bad bargain in deciding to take over the street railway system. We have lost, at the very start, a million and a half dollars a year in percentages and taxes—an amount which was increasing at a rapid rate and was becoming a real factor in reducing our tax rate. The mayor of Toronto was one of the most active opponents to a renewal of the franchise and yet in the face of having added a million and a half to the city's taxes he has the audacity to demand a rate of fare which must immediately mean a further demand on the already over-burdened taxpayer.

If municipal ownership is right, it will persist; if it is not, it will fall into discredit. Its weakness to-day lies in the fact that its strongest advocates are afraid to tell the people the truth—afraid, or wilfully dishonest.

The time is long overdue when Toronto should have as its chief magistrate a man with qualifications fitting him to deal with the problems of municipal government from a business rather than a political standpoint.

The Radio Research Club of Canada

The members of this club are now assembling again for the winter and holding meetings in room 23 of the New Electrical Building of the University of Toronto.

Meetings are held every three weeks, on Thursday evenings, commencing at 7.30 p.m. First meeting of the season was held on October 13th. The president asks that those who are interested in Radio either as a business or a pastime, come and join the club. The aims are as follows:-

(a) To bring together for mutual pleasure and benefit, engineers, students and manufacturers of radio apparatus, who are interested in high frequency phenomenon, especially in its application to radio communication.

(b) That the members may be the better able to co-operate in radio research.

The following are the officers of the club: Honorary President, Prof. T. R. Rosebrugh; President, C. A. Culver, Ph. D.; Secretary-Treasurer, F. K. Dalton. Executive Committee—W. C. C. Duncan, J. E. Genet, E. J. Bowers.

This club is desirous of including in its membership all of those whose work or interest brings them in touch with the problems of radio communication. Application for membership may be submitted in writing to the Board of Directors, through the secretary, and must bear the written endorsement of at least three members of the club in good standing. Applicants should state their present occupation and the extent of their experience in radio work.

The address of the secretary is, Hydro-Electric Laboratories, Strachan Avenue, Toronto. Adel. 4170

The Electric Club of Toronto

The first meeting of the autumn season of the Electric Club of Toronto was held on Wednesday, September 28. This year the meetings are held at Bingham's, 86 Yonge St.—first floor up. The guest of the Club was Brigadier-General C. H. Mitchell, C.M.G., Dean of the Faculty of Applied Science and Engineering, University of Toronto, who gave an address on "Mountaineering." The meeting was well attended and the members seemed delighted with the entire bill of fare. Mr. W. H. Winter, plant superintendent Bell Telephone Company, Montreal, was also a welcome guest.

International Exchange

Mr. A. J. Glazebrook, of the firm of Glazebrook & Cronyn, exchange brokers, addressed the Electric Club of Toronto at its second meeting on Wednesday, October 5th. Mr. Glazebrook's subject was "International exchange as it affects the domestic and foreign trade of the various countries." The speaker traced the development of the exchange problem from the early ages when people dwelt in isolated communities, neither importing or exporting, up to the present time with its thorough interchange of both commodities and people. The present disturbed conditions of international exchange are not easily explainable, but are probably due in large measure to the attitude of mind of the citizens of the different countries. The only possible remedy is a temperate expenditure coupled with increased production.

The attendance was one of the largest in the history of the Club in spite of the last minute changes necessitated by repairs going forward at Bingham's. The chairman announced that permanent arrangements had been made to hold the Luncheons regularly at 86 Yonge Street, but the Club had found it necessary to obtain a minimum attendance of 100. Judging by the attendance of the first two meetings, this will not be difficult, but members are asked to keep it in mind and make their attendance at the Club meetings as regular as possible.

Development of Electro-chemical Industries at Shawinigan Falls

At the Sept. 16 luncheon meeting of the Vancouver Electric Club, Dr. M. J. Marshall, assistant professor of chemistry at the University of B. C., was the principal speaker, his address on "Development of Electro-Chemical Industries at Shawinigan Falls" proving a most interesting subject to his audience. Dr. Marshall was careful to remind his hearers that he was presenting no new material, but rather reviewing briefly for their information, a very well-known development of hydro-electric power and its practical application in advancement of chemical industries in Canada.

After a brief review of the history of the Shawinigan Water and Power Co., the present conditions at the Falls were described. The output has been rapidly increasing, culminating in the new 40,000 k.w. unit at present under construction. The total development at present is estimated at about 400,000 h.p., while the probable future development is over 600,000 h.p. The great La Loutre dam, more than 200 miles north of Shawinigan Falls, serves to regulate the flow of the St. Maurice River, and thus make possible a greater output than could otherwise be obtained. This dam backs up an area of water amounting to about 360 sq. miles, sufficient to produce one year's supply of water at the present output.

Shawinigan Falls is ideal for the location of electro-chemical industries for several reasons:

- (1) The comparatively low cost of power.
- (2) The ideal labor supply.
- (3) Proximity to markets and seaports.

As a result of these conditions, numerous chemical industries have been established at Shawinigan Falls in recent years.

Canadian Electro Products Co.—

After describing the various industries at Shawinigan Falls in general, further consideration was given to the plant of the Canadian Electro Products Co. On account of the great demand for acetone for the manufacture of cordite during the war, the Shawinigan Water and Power Co. was approached by the British Government, through the agency of Dr. R. F. Ruttan, with a proposal that they undertake the manufacture of acetone from acetylene gas. Mr. H. W. Matheson was appointed Chemical Director of the new enterprise, and assisted by Mr. H. S. Reid, experimental work commenced early in 1916. Although the process existed in a very imperfect form on paper only, and in spite of several previous unsuccessful attempts at operation by other companies in the United States, the experiments were successfully completed. On the basis of these results a large plant, involving an expenditure of about \$1,500,000, was erected and in operation within one year after the commencement of the experimental work. The process consisted of four steps:

- (1) Manufacture of acetylene from calcium carbide.
- (2) Production of acetaldehyde from acetylene.
- (3) Oxidation of the acetaldehyde to acetic acid.
- (4) Conversion of acetic acid to acetone.

This last process was discontinued October 1917 and acetic acid has been the chief product of the company since that date. The plant is at present in operation, and the company is prepared to supply high grade water white acetic acid at all concentrations at market prices.

The numerous technical difficulties met with were briefly discussed, and it was pointed out that the successful establishment of this industry was as much the result of unflinching determination as of technical and scientific

ability. The process has been the object of much interest to chemists from other countries, and its successful development, together with other recent technical advances in Canada, has added much to the prestige of Canadian scientific and technical men.

In conclusion it was pointed out that such new processes are the result of past training in the graduate departments of our Canadian universities. Consequently, if Canada is to have her share of such advances in the future, the universities of Canada must receive the hearty support of the public, both financially and otherwise.

Turbo-generator operated Five Years with only a Few Short Stops

For five years a 3200 kv.a. turbo-generator has been operating in the power plant of the city of Saskatoon, province of Saskatchewan, Canada, without a breakdown to mar the continuity of its performance. This, while not a record, indicates a sturdy mechanism that carried its load despite the severe handicap of extremes in temperature, which are common in that portion of Canada in which the generator is located.

The unit was installed by the Westinghouse company in 1914, being put into operation November 24 of that year. Except for a short period in the summer of 1919, it has been continuously available for service. Furthermore, the unit was not taken off the load at that time on account of mishap to the machine proper.

According to the chief engineer of the city of Saskatoon, who is responsible for the performance chart which accompanies this article, the periods shown when the unit was not in operation are not on account of non-availability for service, but on account of the load being so light at the time that it could be carried by a smaller turbine.

Other performances are stated by the city engineer. In summary, they show that the governor operated between extremes of load which varied from 300 to 2850 kw. in perfect control. The only portion of the entire equipment that was

ever removed was the governor pedestal cap for the purpose of renewing a gasket on the gland runner joint. The condenser, too, has proved reliable. On one occasion when ice shut off the water intake 17 times in an eight-hour run no trouble to the tubes or plates occurred under this unusual strain. The La Blanc air pump never has given any trouble with condensing water at a proper temperature, having shown that it was quite easy to run as low as point six from the barometer, at all loads. In conclusion, the chief engineer stated that any records of economies of this unit exceeded those guaranteed by the manufacturer.

In regard to the chart prepared by the city officials, two runs of long duration can be noted. The first of these is from October 6, 1916, to April 22, 1917, and the second from June 12, 1917, to March, 1918. In the first run the load factor was 46.3 per cent., while in the second it was 46.6 per cent.

An inspection of the unit was made in August, 1920, at which time no replacements were necessary, as no wear was noticeable. Since that time the chief engineer states that the unit has been operating satisfactorily and shows indications of an unusually long life.

Illustrations Showing Chippawa Progress

The illustrations shown on the two following pages represent the progress that had been made on the Queenston development of the Hydro-Electric Power Commission of Ontario up to about the end of May. Later reports are that the first unit will be ready, to operate some time in December. Owing to the slackening in industrial demand and increased blocks of power which the Commission has been able to pick up at different points, there is no sign of shortage and the indications are that Ontario will go through the coming winter with an ample power supply.

Mr. J. N. Tremblay, 266 Pine Ave. East, Montreal, Que., has been awarded the contract for the electrical work on a \$60,000 bank building being erected at St. Catherine St. East and Defresne St., Montreal, for the City & District Savings Bank.

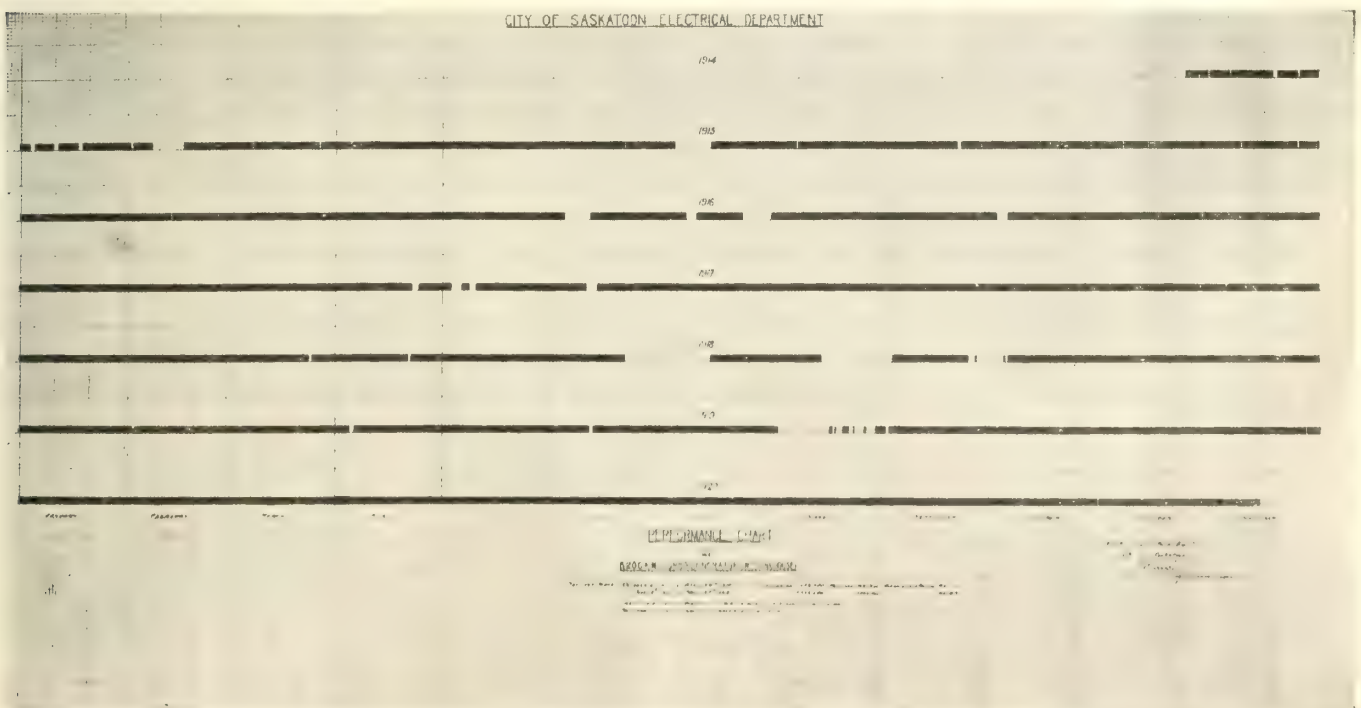
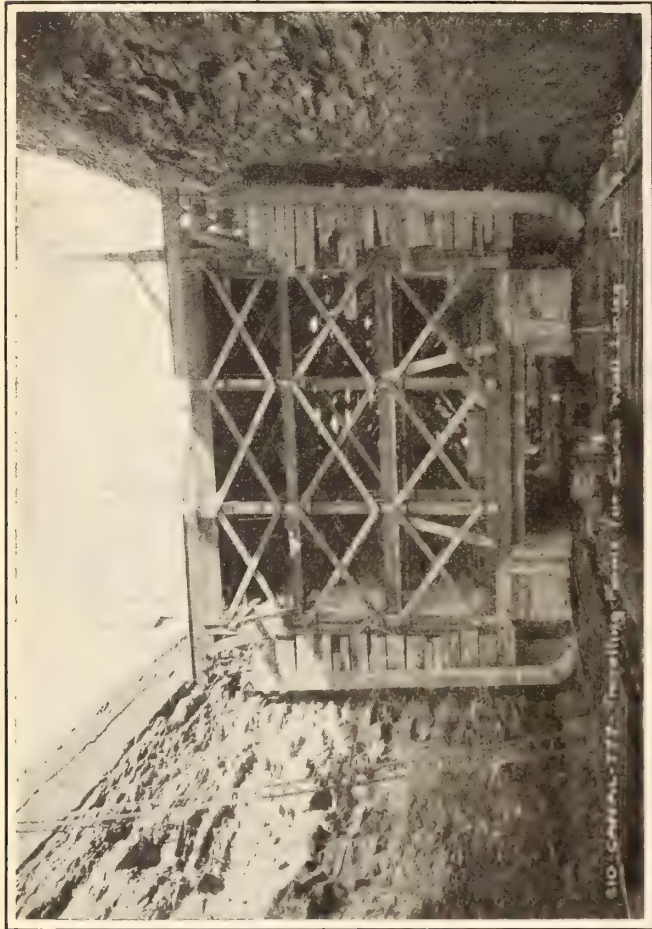
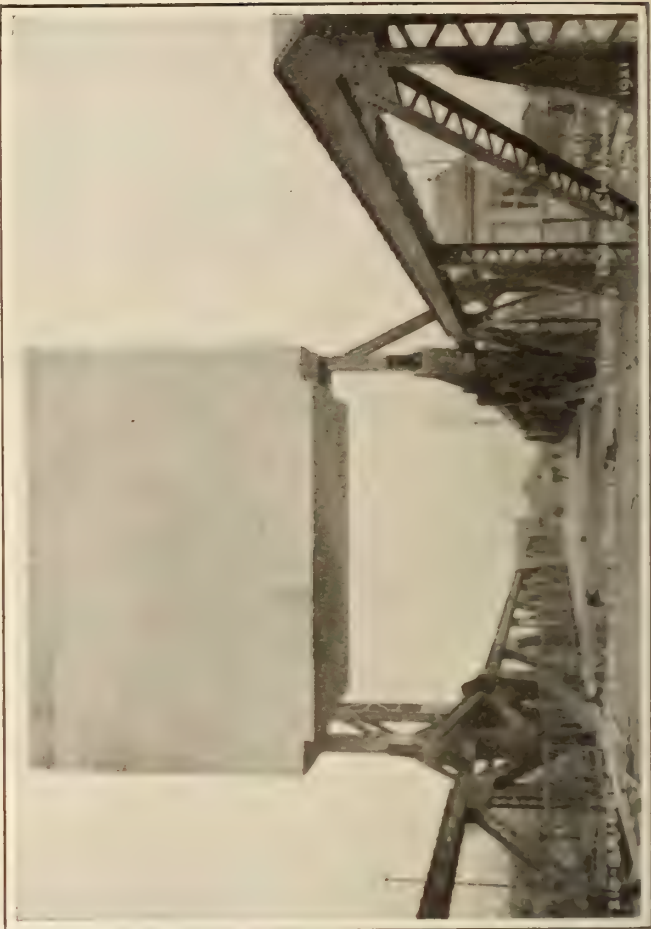


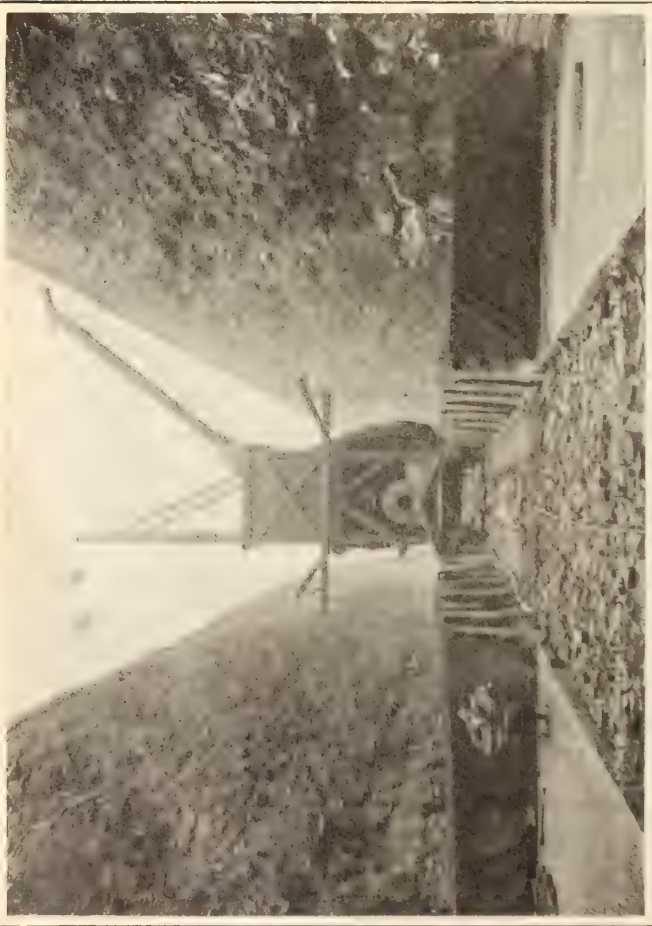
Chart Showing Duration of Continuous Operation of Saskatoon's Turbo-generator



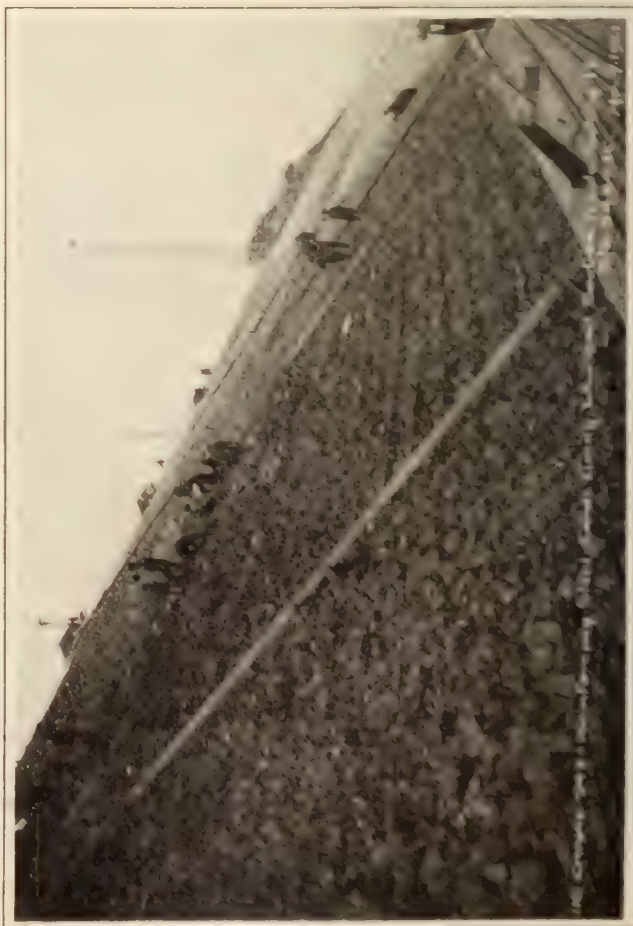
Travelling forms for canal wall lining.



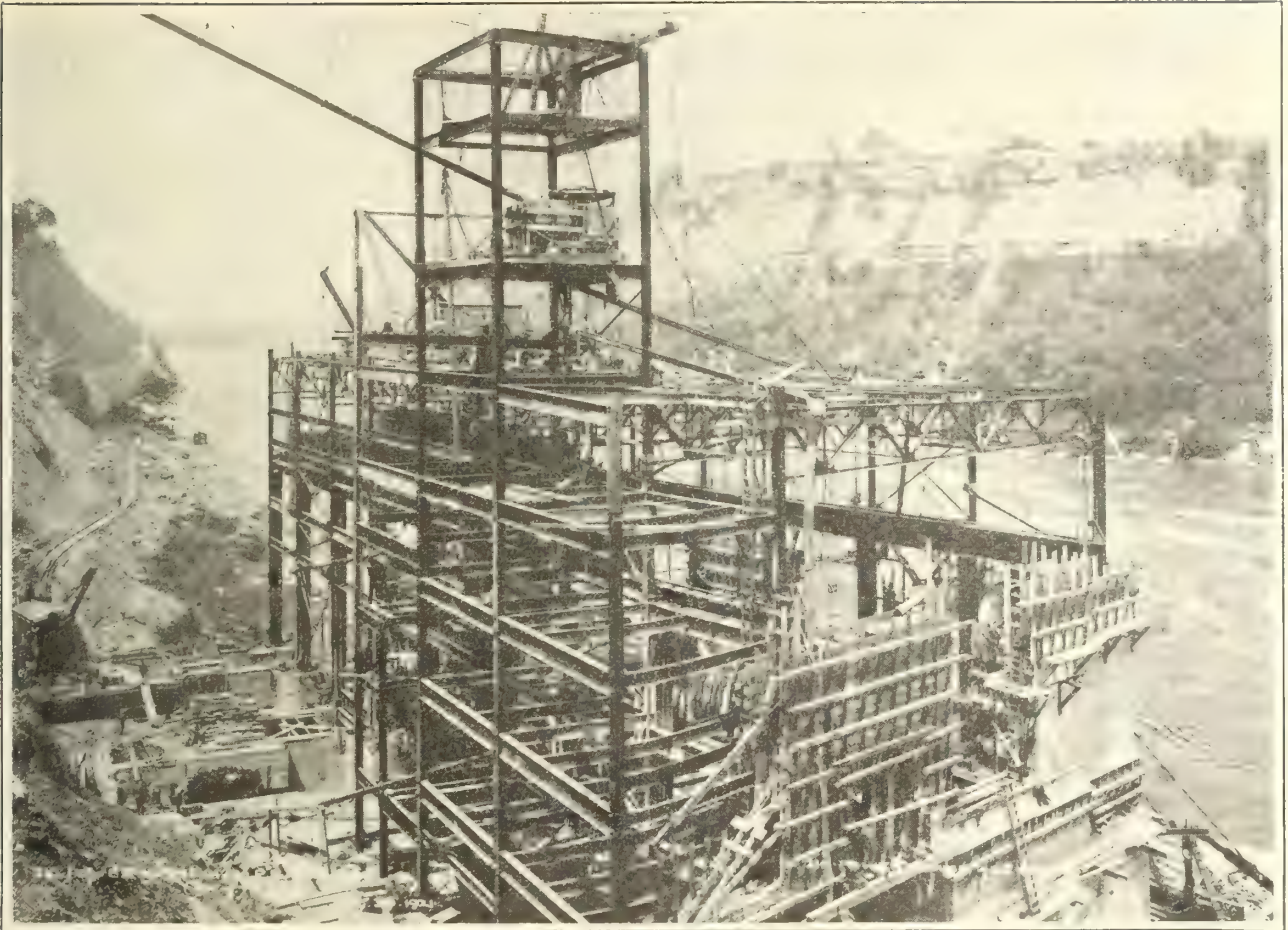
New highway lift bridge at Chippawa.



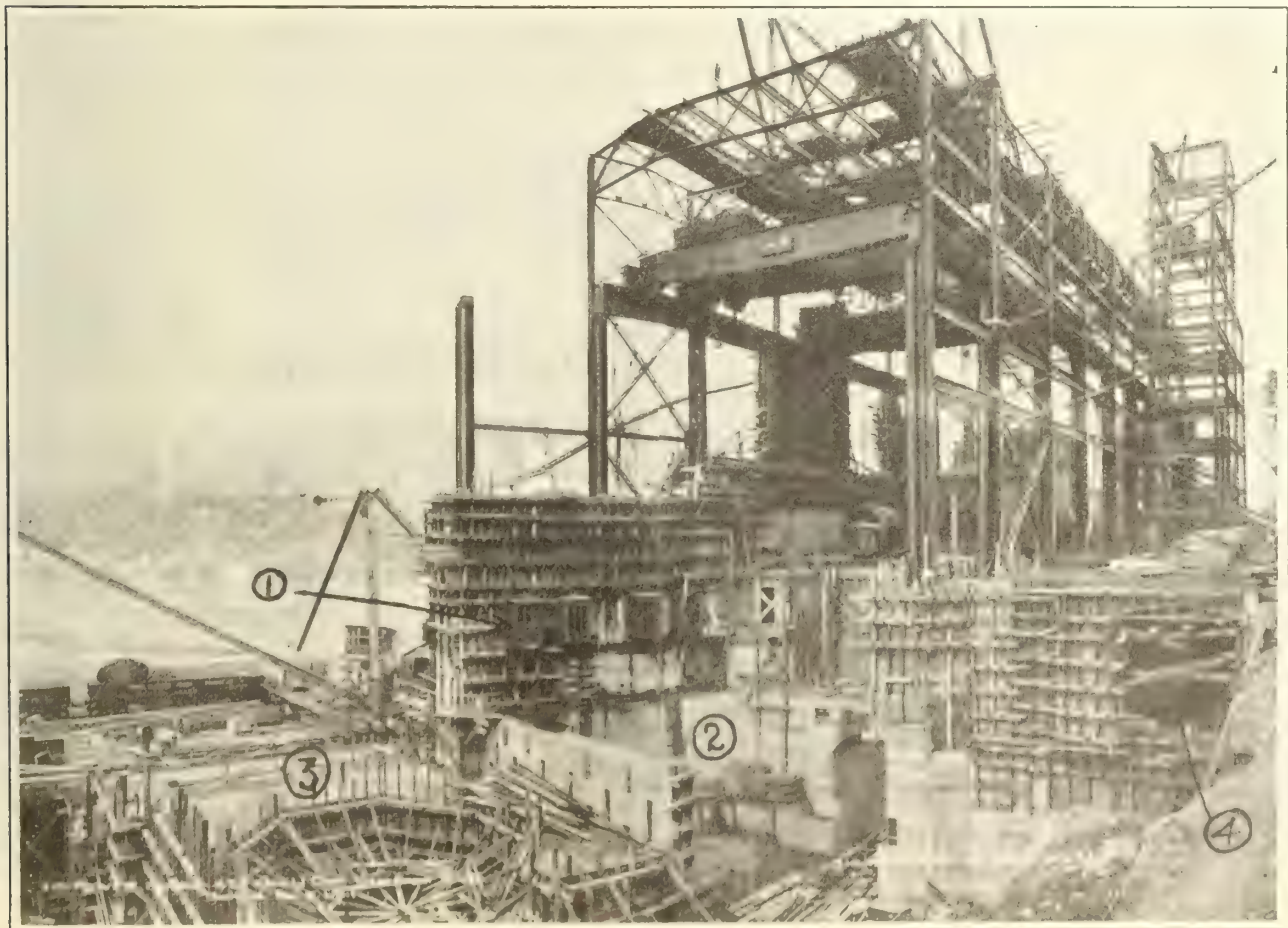
A number of interesting views, showing various construction features of this colossal undertaking. Concrete plant laying floor in rock section of canal.



Reinforcing steel for canal lining. Whirlpool section.



Queenston generating station under construction, Hydro-electric Power Commission of Ontario



Another view of the Queenston generating station under construction. May 30, 1921.

Power Extensions in Manitoba

The Winnipeg - Portage la Prairie line Extended South to Morden,
Supplying Many Towns and Rural Municipalities with Electricity

In our issue of March 15 of this year we published an article on the Winnipeg-Portage la Prairie transmission line installed by the Manitoba Power Commission. The article was written by the chief engineer of the Commission, Mr. J. Rocchetti. At the time this article was printed the main line between Winnipeg and Portage la Prairie was completed but the branch line from Oakville to Morden was still under construction. We are now in a position to add a description of the Morden line. The information was obtained from a paper presented by Mr. Rocchetti before a recent convention of the Engineering Institute of Canada held at Saskatoon.

Although this line was not designed to become a backbone of a system, the demand for power from several districts compelled us to use it temporarily as a main line.

The line to Morden, which supplies Elm Creek, Carman, Roland and Morden, was branched out at Oakville, about 45 miles from Winnipeg. This line is 56 miles long, and of single circuit type with ground wire. The supports used are of latticed pole type with concrete foundation, specially designed. A peculiarity of this line is the staggering of the insulators. The span used is 425 feet with No. 1. aluminum steel cord cables.

Out-door sub-stations were installed at Carman, Roland & Morden. At Jordan is an out-door sub-station stepping down from 66,000 to 2,200 volts. This latter voltage is to feed comparatively short lines, carried on light poles, such as the Bates poles, which are used to supply Roland at present. Several lines of this kind have been already mapped out and will be built in the near future.

The cost per mile of the Morden Line without including the sub-stations is about four thousand four hundred dollars.

As the system started to extend, it was decided to install the second circuit on the Portage Line; this had to be done without interrupting the service in the system. The work, although of a very dangerous character, has been carried on without the least accident and with as little interruption as possible. To change the transposition the line had to be made dead, and this work has been done on Sundays, so as not to stop service to power users.

The activity of the Power Commission has not been concentrated entirely on the construction of power lines. Distributing networks have been erected in Carman, Roland, Morden, Virden and Minnedosa, and all operating features are under the control of the Commission. Virden and Min. edosa were operating two power plants, with semi-Diesel engines. In Minnedosa, the Commission took over the hydro plant of the Minnedosa Power Co. which will be re-designed in the near future and operated in parallel with the oil plant. All construction work has been carried on by the Commission's own staff.

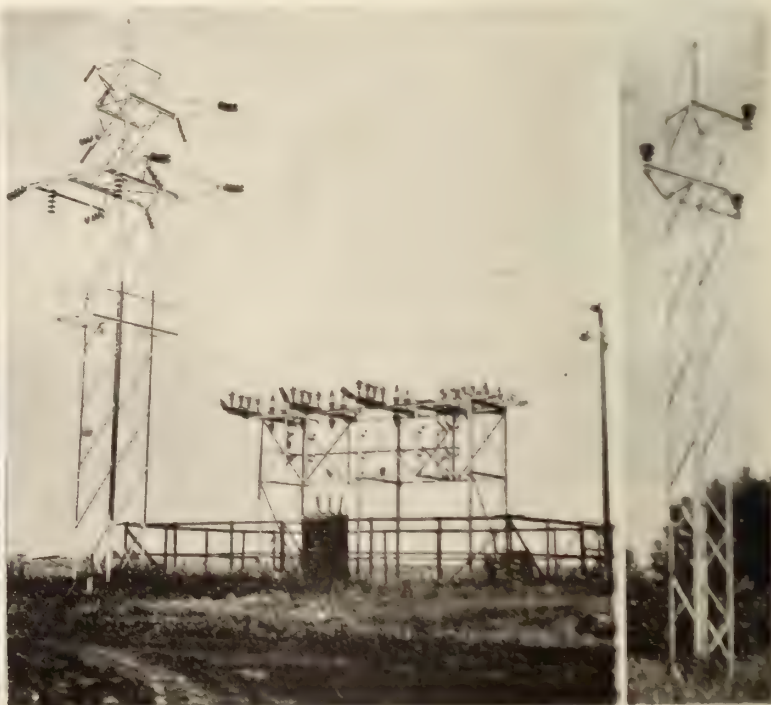
Re-established Service Quickly.

In the early morning of the 2nd of July this year, a cloud-burst raged over the southwest part of Manitoba, with wind of cyclonic force. At that date about two miles of towers failed. To re-establish the service as quickly as possible, a temporary wood line was built, and in less than a week, the system was in operation again.

No criticism has been spared as to the design of the Portage Line, especially concerning the use of flexible towers. These have been used quite extensively by a great number of power companies, and have been recommended by some of the best authorities in transmission line construction. Others have stated that the whole line was too lightly built



Out-door Sub-station at Carman



66,000/2,200 Station at Jordan

Steel Line Tower

and unable to give a reliable service. However, in the spring of the present year, there raged over the prairie a sleet and wind storm, that did no damage whatever to the line, when telephone and telegraph poles were put down for miles and miles.

The towers were designed for six conductors and ground wire using "B" load, or one-half inch ice plus eight pounds wind per square foot at 0° F.

The flexible towers were designed for a normal load, applied at middle cross-arm of 3000 pounds and the square towers were designed for a breast pull applied at the same point of 3500 pounds. To satisfy ourselves after the wreck

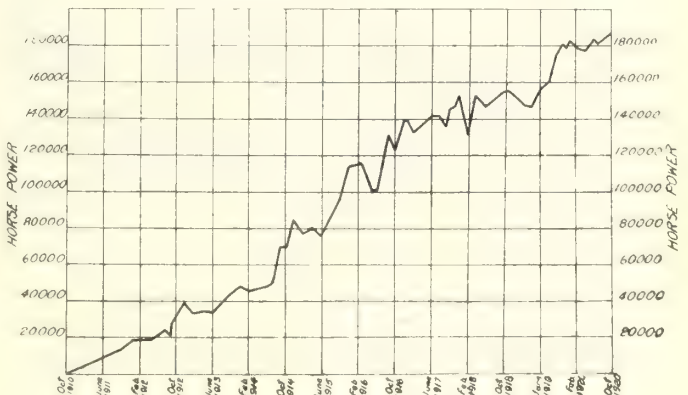
the previous test.

The third test was made with a standard square tower without conductors or ground wire. The footings on the tension side started to pull when a load of 6705 pounds had been applied. At 7100 pounds the tower did not show any deformation whatever, and the test stopped, because the tower would have been destroyed through failure of footings.

The tests showed conclusively that the towers were properly designed, and only an overload of a magnitude which was impossible to be considered, had been the cause of the wreck. The tests were very carefully made, and witnessed by several interested spectators.

Annual Report, Ontario Hydro Commission

The Hydro-electric Power Commission of Ontario have issued their 13th annual report, Vol. 1, which covers the year ended October 31st, 1920. The report states that the results of the year's operations have been the most successful in the history of the Commission. Operations in the various systems controlled by the Commission are outlined at length. The report is also well illustrated and one curve in particular is of



A Steady and Consistent Increase in Demand

unusual interest, showing, as it does, the gradual, though persistent increase in power used by the districts supplied by the Commission from October, 1910, to October, 1920. It is remarkable in that this curve in effect is almost a straight line, in spite of the war which intervened. Since the termination of the war the falling off in demand is shown to be only temporary, representing a brief pause in the irresistible increase. In September, 1920—just a year ago—the demand reached 200,000 h.p. A foreshortened reproduction of the Commission's curve is shown herewith.



Out-door Sub-station at Roland, 22,000/2,200 volts

occurred a full field test was made with towers standing and under normal conditions, that is to say, with conductors, insulators, etc. and the result of this test is as follows:

Tower Tests

The first test was made with a flexible tower guyed four ways. This tower failed at the head, member No. 2, buckling, when the reading of the dynamometer reached 1450 pounds, which in taking the efficiency of the tackle and blocks at 75.2% gives an actual pull of near 7000 pounds.

In the second test, the failed member was replaced and all guys removed, then the load applied. The footings began to fail when under a load of 3280 pounds. The tower failed when the load reached 5482 pounds, caused by the footings on the tension side being pulled out about half a foot. We have to consider that this tower had been overstressed on



A Striking View of Vancouver City from the Top of Grouse Mountain—six miles distant

Montreal West Instals Nine Miles of Well-Illuminated Thoroughfare

Another name was added to the list of well lighted towns on Friday, September 9th, when the current was first turned on to a complete, modern installation of street lights by Mayor Ballantyne, at the Town of Montreal West, P. Q.

The installation covers the whole town, about nine miles of thoroughfare being illuminated, and is the finishing touch to a long list of improvements that include well-paved streets, public buildings, schools and parks. There are no extensive business or retail districts in the town, owing to its proximity to Montreal, so there is no need for the intensive illumination of a "white way". The illumination was, therefore, laid out to suit the requirements of a purely residential district.

Cast iron standards to the number of 288 were installed; the standard is shown in Fig. 1. The height to light centre is 12 ft. Each standard is equipped with a 250 c.p. Mazda type "C" 6.6 amp. lamp in a North ern Electric No. 100 type globe of diffusing glassware. The canopy is equipped with a porcelain enamelled reflector; at the base of the standard, a suitable door is provided for access to the combination cut-out and cable terminal.

The standards are installed on concrete bases, 4 ft. deep, and 2 ft. square at the bottom, tapering to 20" square at the top. Duct ways for cables are formed in the base. They are installed approximately 150 ft. apart, and are staggered on both sides of the street, with the exception of Westminster Avenue, which is much wider and is also the business street, where

lamps are placed 100 ft. apart on staggered centres.

The connections between lamp standards and to the transformer station are made with No. 8 B & S gauge single conductor, paper insulated, lead covered and armoured cable laid 18" deep in the boulevard space between the curb and the concrete sidewalk. As the whole of the streets are permanently paved, it was desired to install the cables with as little disturbance as possible to the pavement. The road crossings were made by forcing a 2" iron pipe under the street; the cable was then drawn in and the pipe filled with a special tar mixture which was forced through while hot. By this arrangement, all trouble due to water getting into the pipe and freezing, thereby damaging the cable, will be avoided. A total of 106 such crossings were installed, and



Fig. 1—A Handsome Standard



Fig. 3 Forcing pipes under the Roadway

in no case was it found necessary to disturb the road surface. Fig. 3 shows the method used in forcing the pipes under the road.

As special attention was also given to the re-arrangement of the surface over the trenches, the installation was carried out with a minimum of inconvenience to the residents in the neighbourhood of the streets.

The transformer station is located in a portion of the Fire Hall building. The equipment consists of four 47 k.v. Westinghouse constant current transformers, 2200 volt primaries, 6.6 ampere secondaries, each transformer is equipped with taps on the primary side for 10% above or below normal voltage, and 10%, 80% and 90% of full load taps on the secondary side. There is also a five-panel switchboard, made up of four transformer panels and one meter panel. The transformer panels are each equipped with an oil circuit breaker connected on the primary side of the transformer; the secondary side is connected through plug type switches.



Fig. 2—View of a Typical Street in Montreal West



Figs. 4 & 5 — The same street, After the New Illumination was installed, and Before

Duplicate three core cables connect to the lines of the Montreal, Light, Heat & Power Company. Double throw disconnect switches in the transformer station provide means for easily changing over from one cable to the other in case of trouble.

Fig. 5 is a night picture, taken while the old system was in operation. This consisted principally of clusters of incandescent lamps suspended from pole brackets at street intersections and midway between, re-inforced by a few arc lamps on the main thoroughfare. Fig. 4 is a night picture of the same street, lighted with the new system.

The general effect of the new lighting is well suited to the character of the town; there is an entire absence of glare, and the distribution is so arranged that there is an ample light between standards. The globe is made of glass, having diffusing qualities such that the actual source of light, i. e., the lamp filament, cannot be located by looking directly at it. Although this means an actual loss of efficiency as measured by photometric readings, it is more than made up by the soft qualities of the light, and by the apparently more even distribution of light, as the eye does not have to contend with "bright spots" around the standards. This feature has already received favorable comment from motorists, who state that while the roadway is well lighted from one end of the street to the other, yet their vision is not temporarily impaired by glancing at one of the globes.

Fig. 2 is a view of a typical street showing the neat appearance of the standards and the manner in which they blend and add to the general appearance. In designing the standard it was aimed to obtain a symmetrical outline rather than to rely on ornate details. It will be noted from the illustrations that the shaft is of plain octagonal section, somewhat of a departure from the usual fluted columns; the only ornamentations are the town coat of arms which appear on four sides of the collar, and a leaf design on the cap.

Messrs. Walter J. Francis & Company, consulting engineers, were responsible for the direction of the work, and are

to be congratulated, together with the town of Montreal West, on the results obtained. The complete equipment was supplied and installed by the Northern Electric Company.

Railway Contract from Chilean Government

The Westinghouse Electric International Company announces that it has received final confirmation of the contract to supply the equipment to electrify the Chilean State Railroad between Valparaiso and Santiago, and the Los Andes Branch. This contract, which was received from the Chilean Government through the company's Chilean agent, Errazuriz, Simpson & Co., associated with Spruille Braden of New York City, covers the most important railway electrification undertaken since the beginning of the war, and the largest ever undertaken by an American firm outside of the United States. The main line, which is 116 miles long, is now under steam operation, and is the most important railway line in Chile. It connects the leading seaport (Valparaiso) with the capital (Santiago), while the line to Los Andes is 28 miles long, and forms the Chilean State Railway section of the trans-continental line to Buenos Aires. The contract, which has a total value of \$7,000,000., was secured in keen competition with German and other European companies. The award was given to the American firm because of its more complete, and correct engineering analysis of the proposition, as well as its low price.

The equipment to be furnished consists of eleven local passenger locomotives, fifteen road freight locomotives, six express locomotives, seven switching engines, and five substations of 4,000 k.w. capacity each. All the locomotives are Baldwin-Westinghouse manufacture. The 3,000 volt direct current system used will be strictly American in character. The capacity of this equipment will be 50 per cent greater than their present traffic demands and the plans have been so drawn that an increase of traffic capacity three times the present demands can readily be obtained.

The Electrical Contractor

Demonstrating the Electrical Idea to more than a Million Inquisitive Observers

The value of organization was demonstrated during the recent Canadian National Exhibition when the Association of Electrical Contractors and Dealers was called upon for assistance to present the electrical idea to the million odd visiting and inspecting public. A fine display of goods was forthcoming as well as an attractive variety of sign cards. Another feature was a Model House Plan, showing basement, ground floor and second storey of a house wired as it should be, to accommodate the various appliances that ought to be found in every modern home. These plans and show cards were the result of energetic action

ELECT
TO LIVE IN AN
ELECTRIC HOME
O.A.E.C.&D.

on the part of the Toronto Section of the Association, and merchandisers in general may feel gratified in the interest shown in these exhibits during the entire two weeks of the Fair. Mr. J. F. S. Madden, who was more particularly in charge of this section of the Electrical Building, put in a busy time explaining the merits of electrical appliances and in pointing out the various features in a well wired, well equipped electrical home.

The ground plan, as well as the first floor flat, is reproduced on the opposite page, and it will be seen that

A WIRED HOME
NEVER GROWS OLD
O.A.E.C.&D.

the executive forgot very little. When it is considered that the plumber's work in the average home runs 20 to 25 per cent. of the total cost, it is incredible that there should be any opposition to, say, five per cent for equipping the same home electrically so that one can light it, heat it and do the washing, ironing, cooking, toasting and a dozen and one other things; indeed, it is probably within the mark to say that many

architects do not allow more than one per cent. for the electric wiring, while three per cent would be considered extravagant. The cause of this lies ultimately, we believe, with the architects, but, primarily, the whole matter rests with the electrical fraternity itself, and the contractors must not shift the responsibility to anybody else. They must point out to the architect, to the general contractor and to the man who pays the shot that from three to five per cent. of the cost of a house expended in electric wiring

WIRE YOUR HOME
SO YOU CAN
COOK, LIGHT, HEAT
BY WIRE
O.A.E.C.&D.

gives better "value" for every dollar expended than anything else that goes into the making of a complete home. It is to be hoped the widest publicity will be given to these plans among Canadian architects, and it is understood that the Association has some such plan in mind.

The show cards were in the form of slogans. Aside from the slogan "Do it electrically" the electrical industry

WELL WIRED
Means
NEVER TIRED
O.A.E.C.&D.

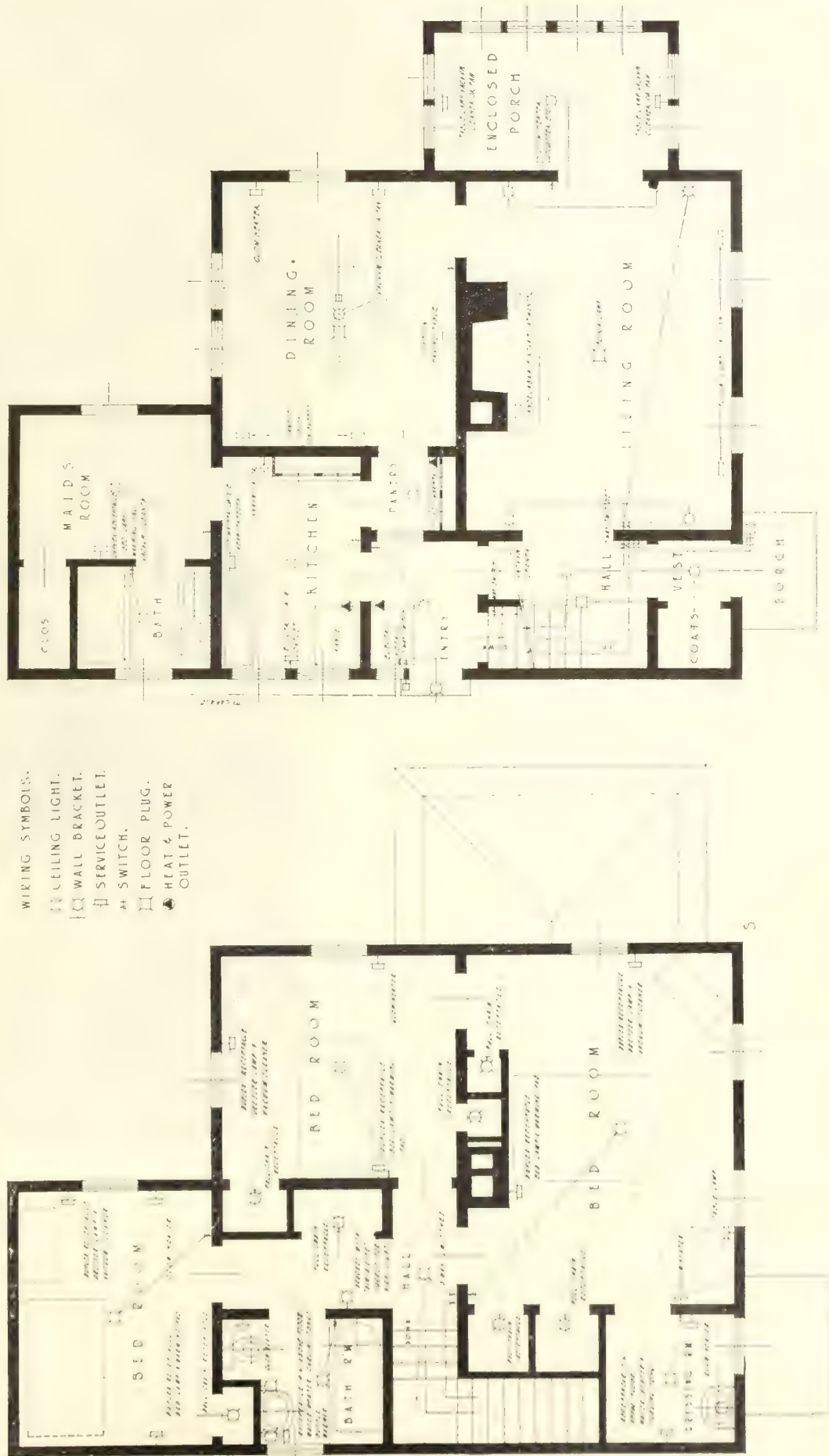
has no particularly catchy phrase with which to attract the public. Any of these cards offer fine suggestions along that line which, in amended form, perhaps, may be taken up from time to time in different local centres. The point

A HOUSE
WELL WIRED
IS A HOUSE INSPIRED
O.A.E.C.&D.

we would like to emphasize, however, is the necessity for a slogan of some kind specially suited to contractors, and another specially suited to merchandising. This may well

The modern home is the house that is properly and fully equipped for using all the labor saving and comfort producing appliances now offered by the Electrical Dealer.

A complete layout planned by the Ontario Association of Electrical Contractors and Dealers



occupy the attention of winter meetings of electrical contractors and dealers throughout the Dominion. The importance of slogans has been demonstrated time and again in other industries—why not in the electrical?

Next to the agitation for a special electrical building, we consider this one of the most important moves that has ever been made to popularize electricity with the general public. There is no place or time in Canada where

**WIRED RIGHT
ALL RIGHT
O.A.E.C.&D.**

so many people, in so receptive a mood, are congregated together as at this annual Fair. People come to the Exhibition for information and instruction. As we said in a recent issue, however, the best results can never be

**WIRE
for
CONVENIENCE
AND
COMFORT
O.A.E.C.&D.**

obtained until we have the finest building on the grounds in a central location. We hope that further co-operation will bring such pressure to bear on the exhibition directorate that this will be an accomplished fact during the coming year.

Winnipeg Electrical Fraternity in "Parade of Progress"

On Wednesday the 28th September, the citizens of Winnipeg witnessed one of the largest and most spectacular parades ever held in that city. Mayor Parnell proclaimed a half holiday to allow everyone to see it and judging by the large crowds that thronged the line of parade it would appear that practically all Winnipeg was on deck. The weather man did his share nobly, as most of the morning it had been raining, and "Old Sol" only made his appearance shortly before the parade commenced, and remained out just long enough to witness the parade and retire in favor of rain.

The Electrical Section, one of the strongest in the parade, was a huge success in every way, especially considering the fact that the Electrical men only had a few days' notice in which to make their arrangements; great credit is due to the following who put in some real hard work to make the Electrical Section the huge success it was: Morris E. Deering, president of the Manitoba Electrical Assn.; Fred J. Pratt, chairman of the Entertainment Committee; W. T. Hunt, Northern Electric Co., Ltd.; Jim Swan, and J. R. Aikman of the city of Winnipeg Hydro, and A. M. Avery, W. C. Taylor, and H. G. Stewart, all of the Winnipeg Electric Railway Co.

The expenses of the floats, etc. were divided between the Manitoba Electrical Assn., Contractor-Dealers Assn., Winnipeg Jobbers, Manitoba Government Telephones, City of Winnipeg Hydro Electric, and the Winnipeg Electric Railway Co.

The float that caused most amusement to the crowd was a replica of an old log cabin on wash day, from which floated a strong odor of soap suds and cheap gin. In one corner was a rusty old stove, with a battered tin wash boiler full of steaming clothes. Dirt, chips, and three ragged children cluttered up the floor; in a corner by the stove stood a pile of cordwood. W. C. Taylor who impersonated an Irish



Above, Manitoba Telephone Float. Next, the Old Log Cabin with its dirt and drudgery. Below, the story of Manitoba's great power resources.

wash woman splendidly, stood over an old wash board rubbing away at some clothes, smoking her clay pipe, and mopping the perspiration from her face. The whole appearance was that of a dirty kitchen in an old log cabin, somewhere in the back woods.

A short distance behind the log cabin was a vivid contrast, showing a fully equipped electrical kitchen with an attractive looking young lady reading the latest fashion hints, while the electric range was cooking the dinner, and the electric washer doing the washing.

Then came "King of Energy, Electricity," in the form



A few of the members of the Manitoba Electrical Association who took part in the Parade of Progress

of a king of by-gone days mounted upon his steed, the largest white horse it was possible to obtain.

Following the King came the famous band of the Winnipeg "Black Watch," which consisted of five members of the Assn., who had their hands and faces blackened, and wore silk hats, old dress coats, and kilts. One of the quintette acted as leader of the band, swinging a baton in a very (un) able manner, another played the bagpipes, two with bag pipes, two with small drums, while the fifth carried a small toy drum. This drummer highly amused the public with the swinging of two large wooden spoons, representing drum sticks, above his head.

Another exceptionally fine float was that of a model showing the immense amount of electrical energy available for Winnipeg, with signs showing that Chicago uses 350,000 h.p. Winnipeg can develop 500,000 h.p., also that the Winnipeg River can develop as much water power as Niagara Falls is developing. The model displayed a water wheel, generator, transmission line and finally the use of various electrical appliances that can be used in the modern home of today. It told the whole story "From Water Power to the use of Electricity in the Home."

Last and by no means least, came the Manitoba Government Telephones float. It was one of the best in the parade, being beautifully decorated in yellow and purple, centred with a huge umbrella, which was surrounded by telephone switchboards with girl operators at work. Ferns and plants added to the artistic appearance of the display. Mr. J. E. Lowry, Telephone Commissioner, and his staff are to be highly complimented on their energy and excellent taste.

Marching to the rousing airs of the "Black Watch" came the members of the Manitoba Electrical Assn., in a body, wearing dark blue hats, and sashes, the hats having M.E.A. printed upon them, a number of the members were carrying banners and signs, with various slogans, such as the following:

Winnipeg—the smokeless city. Her industries are electrically operated.

Winnipeg has sufficient electric power to turn the wheels of every factory.

Electricity makes a house a home.

I turn the wheels of industry; I represent progress; I am Electricity—Winnipeg's servant.

The progress of civilization is measured by the development of electricity.

Nature's power harnessed for Winnipeg's citizens.

Electricity represents—"The best possible service at the least possible cost."

Say it electrically—flowers die.

Winnipeg rate for electric current is the lowest in North America.

Put electricity to work.

Do it electrically.

Electricity is the modern servant.

Electricity brings brighter and happier hours in your home.

No power is as cheap as Winnipeg's electrical power.

First wire your home adequately then you'll enjoy your home.

Electricity is cheap and plentiful—use it.

Wash without work—use electricity.

Lighten the labor of your home—use electricity.

Niagara District Active

The electrical contractor dealers of the Niagara District Organization held a further meeting on September 26 in the Builders' Exchange, Welland. Mr. J. H. Sandham was in the chair. Much of the time was occupied in discussing the wording of an Act licensing electrical journeymen and contractors which it is hoped to get through the Local Legislature at the next session. A number of amendments were proposed and after considerable discussion, it was moved by Mr. V. K. Stafford that Messrs. J. H. Sandham, F. W. Martin and W. McKenzie be a committee to bring in a report at the next meeting of the Association, which will be held in Niagara Falls in the near future.

The Welland contractors deserve a great deal of praise for the way they filled the role of hosts, a very enjoyable repast being provided for the visitors. One new member was received from the Welland district.

This district organization is making very fine progress and a keen interest is being shown by all the members in the activities of their Association. They expect to receive their charter in the immediate future. At the next meeting permanent officers will be appointed.



BETTER MERCHANDISING



What Are We "In Business" For?

By C. D. Henderson

Ask any electrical contractor-dealer the question "what are you in business for?" and, naturally, he will answer "to make a profit." And yet day after day he sells goods and takes contracts on which he knows right down in his heart there is no profit.

Ask him **why** he does this and he will quite likely tell you that he can not obtain a fair price because of competition. In other words, he admits that he is guided, or we might say ruled, by his competitors rather than by his good judgment.

This is regrettable condition of affairs that exists in very few other lines of business and it is something for which there is no excuse.

I have had the pleasure of discussing this question with contractor-dealers from Halifax to Vancouver and altho it is gratifying to know that there are an increasing number of well managed concerns really making substantial head-way, the great majority of men in the electrical business are no better off to-day than they were ten years ago in spite of the fact that their records show a yearly growth in volume of business. The average electrical dealer works longer hours and gives more attention to his business than men in other lines. He finds no time to play golf, nor can he afford to spend the winters in California and yet the service he is rendering to the community is of greater importance than that given by most other merchants.

These are not theories, but actual facts. We all know it. We have been told the same thing hundreds of times and yet we go on in the same old way hoping that things will come out on the right side.

These conditions must be eliminated, but it is entirely up to the men in the electrical trade. No outsider gives a tinker's hoot whether we succeed or not and the quicker we realize this the sooner we will take steps to place our business on a good sound basis.

Here is the Solution

Here is the solution:- Nothing startling about it—acknowledged and applied with success in every other line that is making any headway. Make no sales, take no job or contract unless you are positively sure that it will cover your original cost—your overhead expense and a reasonable profit. There is nothing complicated about it. You know your costs; investigations have proven that overhead in the electrical business is not less than 25% (on the selling price) and you are entitled to a net profit of at least 10%. Never mind your competitor. If he is fool enough to sell goods or take work too cheap, let him go to it. The more work he does, the sooner he will quit. No man can take two from two and have one left, and you and I are no exception.

I have issued a little booklet showing the proper method of figuring the selling price which I would be glad to mail to any reader free of charge, if he will simply send me his name and address.

Permanent Electrical Exhibition at Montreal

Thursday, September 15th. 1921 was an important date in the annals of the electrical trade of the Province of Quebec in that it marked the official opening of a Permanent Electrical Exhibition under the auspices of the Electrical Co-Operative Association, Province of Quebec, in the M. L. H. & P. Uptown Power Building, 605 St. Catherine Street West, corner of Mountain Street, Montreal.

This is the first and only permanent electrical exhibition and speaks highly for the progressive policy followed by the Executive of the Electrical Co-Operative Association, Province of Quebec, who have every reason to expect good results from this venture if one is to judge by the evidences of appreciation which have been coming in constantly in the form of attendance at the exhibition and congratulatory messages received from all quarters.

Official notifications and invitations were sent out broadcast through the newspapers and direct to individuals, associations and firms, advising all that the exhibitors were at the disposition not only of the electrical interests, but of the public at large with the object of demonstrating to them the application of electricity in the home, its many uses and the advantages to be had with the many electrical appliances which can be so conveniently and usefully installed therein. Thousands of visitors have already called and to them have been demonstrated and explained the advantages of the electric washing machine, ironing machine, sewing machine, dish washer, vacuum cleaner, percolator, toaster, etc., emergency flashlights, all kinds of portable and stationary electrical devices with current supplied from dry batteries and transformers, wireless telephone, violet ray generators; in fact everything that could be included in a Household Science Exhibition. It is the intention of the exhibitors to hold open to the public the various booths wherein any appliance or apparatus is shown, for the purpose of explaining to anyone, whether or not interested in the immediate purchase of the same, as they feel that in this way the electrical idea will take and occupy in the public mind the important place it so justly deserves as leader among the most modern and beneficial achievements in the application of science. It must be noted here that the average lay mind will concede that important progress has been made in the development and application of electricity, but it does not know the plain facts of its application and can only judge of them in an exhibition of this kind where facilities exist to drive this fact home; it realizes then and then only, to what extent household electric labor saving appliances have been produced and the comforts and conveniences which their use will bring in the home.

The electrical trade, more especially the contractor-dealers, are invited and expected to take advantage of these demonstrating rooms for their benefit and that of their prospective customers; the courtesies of the exhibition are extended to them so that they can see clearly the possibilities of the merchandising field; where they have no facilities to demonstrate an electrical appliance which a prospective customer may want, due to lack of stock or space or electrical facilities, they can either send or take their customers to these demonstrating rooms where the particular piece of equipment is shown and moreover the prospective customer

may see other appliances which had not been thought of in the first instance. The Executive of the Electrical Co-operative Association, Province of Quebec, deserve the congratulations they are receiving from all quarters for their aggressive policy and progressive ideas in their efforts to bring about a betterment of conditions among the electrical trade and the public.

The space in the M. L. H. & P. Uptown Power Building where the permanent electrical exhibition is now on has been allotted to the members of the Electrical Co-operative Association and the courtesies of their several stores throughout the different parts of the city have been extended to the exhibitors for the benefit of the public living in these sections; there will be periodical demonstrations run at these various M. L. H. & P. branch stores, notices of which will be sent out in each case. The present exhibitors at the Uptown Power Building include: the Montreal Light, Heat & Power Cons., the Canadian General Electric Co. Ltd., the Northern Electric Co. Ltd., Marconi Wireless Telegraph Co. of Canada Ltd. and such well known products as the Hotpoint, Hoover, Mitchell, Canadian Beauty, Columbia and Eveready are now on view and it is expected that more will follow.

Get Ready for Early Christmas Shopping Season

With the mailing to the trade of a folder describing plans and selling helps The Society for Electrical Development, will launch its seventh annual campaign to help the electrical industry promote the buying of electrical Christmas gifts. This folder will be in the mails about the middle of October giving ample time to prepare plans and order material.

As an introduction to the plans the first page of the announcement will carry to all electrical people a greeting and a few inspirational comments. The three major selling helps offered by the Society this year are:—

1. An elaborate set of window display cut-outs.
2. A set of store and window display cards including one large card with eight smaller price or suggestion cards.
3. A beautiful 8-page folder including an invitation to visit your store together with many illustrated gift suggestions. This is designed to be mailed to prospective customers, to be enclosed with letters or distributed at the store.

The keynote of the campaign is expressed by the slogan, "Bring Back Business by Getting Busy Selling." Merchants are urged to get their selling activities into full swing as early as possible on the theory that people are learning to "shop early" and the electrical merchant must, therefore, be ready to sell early.

It has been the experience of the Society that each of its Christmas campaigns has shown an increase in material ordered over the preceding year's drive. All signs indicate that this year will follow the rule.

Campaign helps are available both to members of the Society and to those who are not members, although members will of course enjoy a considerable price advantage.

Folders descriptive of the campaign will be mailed to all electrical people interested. Write The Society for Electrical Development, Inc., Executive Offices, 522 Fifth Avenue, New York City. Cover of Gift Suggestion Folder produced by S.E.D. as one of its Christmas Campaign Selling Helps.

Henry Munderloh of the firm of Munderloh & Company, Limited Montreal is dead in his 65th year in Burlington, Vt. The late Mr. Munderloh was born and educated in Montreal and went into business with his father. Owing to ill health he was not actively connected with the business for some time.

A Modern Electrical Home Exhibit in Montreal

A Modern Electrical Home was opened for public inspection on Saturday, September 17th, 1921, at No. 7, Kindersley Road, Mount Royal City (Model City) under the auspices of the Electrical Co-operative Association, Province of Quebec. Everything electrical which can be used in a home is on exhibition there and demonstrated to the public by representatives of electrical interests; it was open for inspection from 2.00 p.m. to 10 p.m. every day until October 2nd, 1921. The home consists of the following:—

Living Room—Electric fire-place, electric piano, electric phonograph, piano lamp, reading lamp, table lamp, portable heater.

Sun Room—Portable heater, reading lamp, desk lamp, fan.

Dining Room—Coffee urn, toaster, grill samovar, kettle.

Kitchen—Electric range, dish washer, buffing motor, egg beater, fan.

Front Bed Room—Boudoir set, warming pad, hair dryer, curling iron and drying comb, vibrator, reading lamp.

Sewing Room—Sewing machine, fan, table lamp, electric iron.

Three Rear Bed Rooms—In each room is a curling iron and drying comb and a dressing table lamp.

Bath Room—Portable heater, immersion heater.

Laundry—Washing machine, ironing machine.

Furnace Room—Hot water heater.

Throughout the house, various types of portable electrical devices such as emergency flashlights of different styles were installed: the vacuum cleaner and floor polishing machine were also in evidence. Convenient outlets were installed throughout this home to show the visitors that it was possible to have all these appliances without making the interior unsightly through the use of dangling cords and wires stretched over the floors. The lighting throughout was artistically arranged and designed to match the decorations and furnishings. It was completely equipped throughout with high grade furniture, rugs, portieres, draperies etc., and was a very attractive home to visit. To a great many of the visitors, the application of electricity in the home has been a revelation; to a great number the contention that labor saving devices in the home make it unnecessary to have servants has been proven; these people now see the possibility of running a house without outside help in a case of emergency and without undue effort. A system of intercommunicating telephones was been installed in the house.

Official announcement of the opening of this home was made to the public by means of co-operative advertising in which the electrical interests and the real estate companies participated and there is no doubt in the minds of those behind this movement that the Home Electrical idea has been properly placed before the public and the benefits should accrue to the public, the electrical interests and the real estate companies.

The following comparative statement of electricity meters tested during the first eight months of 1921 and corresponding period of 1920 is supplied by the Department of Trade and Commerce, Ottawa.

January.....	7,294	9,702	7,344	12,229
February.....	6,677	10,512	6,102	15,155
March.....	6,621	9,785	6,103	11,460
April.....	7,393	12,601	7,782	13,987
May.....	7,666	9,567	9,407	10,534
June.....	8,294	9,885	7,981	12,132
July.....	7,385	9,757	5,089	12,392
August.....	6,812	10,189	5,450	10,769
Total.....	58,142	81,998	55,258	98,653

Sales Campaigns

By E. H. PORTE*

General Manager, Renfrew Electric Products, Ltd.

Mr. Chairman and members of the Association,—It is indeed a pleasure to be with you again to-day, particularly as it was my misfortune to miss last year's convention. Mr. Edgar, who spoke just before me, stated he didn't know why he had been selected to talk on window displays. I can assure you, gentlemen, my predicament is very much greater than his. It would take the finest sales campaign ever inaugurated to tell me why I should be asked to address you on sales campaigns. I can't imagine the reason.

I have not tried to write a speech; I don't even know how to talk distinctly. I have just made a few random notes about some of the little things on sales campaigns that have been picked up from time to time.

I think one of the first things that might be mentioned is the reason why sales campaigns are necessary to-day. A good many years ago the only products that were available on the market were those things essential to life and human existence, and as a result practically all trade was carried on by barter and exchange; one man went down and swapped a bag of potatoes for a bag of rice, and so on. The early pioneer inventors such as Westinghouse and Edison and dozens of others gave us inventions which were the basic fundamental principles of our present manufacturing facilities. Some of those early inventions were the basic fundamentals of what is carried into being to-day by the Hydro, and to those men we are indebted for a number of the products on the market to-day. As those manufacturing facilities were developed, other inventive genius developed the products to make, and in a few years the number of products on the market developed and multiplied to such an extent that something had to be done to make the public absorb them. Many of those products filled wants which had not been created. The wants were there, but the public didn't really know they needed those things. Advertising had to be called into play to tell the people what the product was, what it would do, where it was made and how much it was sold for, and as advertising developed and became more and more of a science the sales campaign became more effective in its application and produced results which were impossible in the early days.

Two Essentials.

Now there has been a great deal of literature published on sales campaigns, and a great deal of the literature published is very good, also it is highly technical from the selling standpoint; the necessity of analyzing markets and dealing with all this sort of thing has been gone into. You gentlemen have neither the facilities nor the time to go into an extensive analysis of that kind. I think the real essentials of any campaign can be boiled down into two things. First, have some definite offer to make to the people, and make sure that the offer you are going to make is something that will fill a genuine want. When you have the details worked out describe them in ordinary, plain English that the everyday man on the street can understand, and sell your offer to the public. That is all you have to do to make a successful sales campaign.

The question naturally arises—how am I going to sell my offer to the public? The first thing necessary to sell anything is to tell the people what it is, and the only way you can tell the public what you have is through the medium of advertising, because you can't possibly hire enough men to go around and tell everybody by word of mouth. So the medium of the local newspaper is, to my mind, the most effective medium you gentlemen have got to use in putting over a sales campaign

to-day. It is the most neglected medium that there is in the whole Province of Ontario. You can take up issue after issue of our local newspapers in the Province of Ontario and you will find a few of the larger Hydro systems advertising in the paper, whereas what I think you ought to find is an ad in every issue of every local paper in every town where there is a Hydro system in Ontario. Think of the influence, gentlemen, that you would wield in a year or so! You always have something to sell; whether you have a sales campaign or not, you have a wonderful service to sell to the people of Ontario and the newspaper is the common place to tell them what it is and how you sell it.

Good Window Displays

Another very important thing in putting over the sales campaign is the necessity of good window display, and, as Mr. Edgar has pointed out, I think the proper window display is one idea at a time. A window is dressed for the purpose of bringing to the public's attention something that you want to tell them or sell them. Now if you can just get them to understand one thing at a time it is pretty good, so don't try too much. I think every window should have one concrete selling idea. It doesn't make any difference what the product is. One particular feature of the service you render can be picked out. Tell about it in your window and don't tell anything more except the price, which should always be in, because you are not catering to the millionaire class exclusively, and unless you are catering to them exclusively, I consider the price should always be in the window. The whole story should be there, but don't fill up the window with a whole lot of products expecting to get any selling results. Another thing is that the window should be enclosed. If you want the public to come along at night and see what a beautiful store you have inside, leave your window display out and run your store floor right to the front. If you want to sell them anything close it in so that their attention cannot be distracted by some fine portable lamp in the corner of your store, when you want them to look at a range in the window.

Folders and Letters

Another important feature of the sales campaign is the fact that you can't be assured every one of your prospects is going to read the local paper on the particular day you advertise. You have a mailing list and you know that everything you mail out is going to reach the hands of the possible prospect; therefore, by all means mail out folders and letters to them all and see that the idea of your sales campaign is clearly outlined in plain, simple English, and don't forget to tell the women what the things will do that you are selling. She is not interested in how, where or when it is made; all she is interested in is, what it is going to do for her. If you have a large town and can afford it, complete your whole sales campaign with salesmen calling on your customers, because in a great many instances the advertising, the window display or the circular letter, or the combination of all three will have almost sold the prospect, but it takes the efforts of a salesman to clinch the sale and get the money.

Intermittent Campaigns

Now I don't think any town running a sales campaign should expect to get all they put into a campaign out as soon as it is closed, because you can't possibly change the buying habits of the public in a day or a week. It takes a long time to do it. You must remember that there are thousands of other people trying to sell goods at the same time you are, and the attention of your prospects is divided, and therefore you must not expect that all of your prospects are going to respond when the campaign is on, and that you will get some overflow results. I have a letter from a chap in Ontario here telling about

*Before Niagara Falls Convention A. M. E. U.

a range campaign he ran recently and saying he had used considerable advertising space, had given an entire floor to display, including windows, had distributed pamphlets and circular letters, etc., and he had sold 156 ranges in one month. He says he thinks intermittent campaigns are the most successful, and he goes on to say during the month of June, instead of advertising ranges, he has advertised wedding presents, but it would surprise you the number of ranges that are still being sold, showing results still overflowing from the campaign. That is the way that it always happens.

Mr. Cuniff has very ably outlined to you many of the essential points of advertising. I would like to emphasize one thing he said, and that is, "don't let a novice handle your advertising appropriation." I agree with him absolutely, and I also think that in Hydro towns, in many cases, there is nobody on the staff who is an advertising expert. Another thing, if they were, they have too much to do to spend much time on advertising, and I think the Hydro Systems in Ontario to-day are in need of a centralized advertising service so that one campaign can be run over the entire Province in one month, followed by another campaign next month on some other device. It might be carried out on the same basis as the National Electric Light Campaign, and I am sure it would produce results.

Speaking as a Manufacturer

I am not talking to you to-day as a manufacturer, but since that is my business, I would like to say one word before I close for the benefit of all manufacturers. A manufacturer's primary business is to manufacture goods. His function should theoretically cease when he produces the goods, and to get the goods into the consumer's hands should be the function of the distributor. It is necessary for him to carry on educational advertising in order to assist the distributor in selling his goods to the final consumer, but the point at which he should stop is rather clearly defined; but in the electrical appliance game in the last seven or eight years the contractor-dealers in the Province of Ontario and elsewhere have left the manufacturer to do all the work and have held back. The average dealer is perfectly willing to gather in the money if the manufacturer will go out and make the sale. He objects to high prices and cuts prices, thinking by cutting prices he can increase his sales. It is a bad policy from start to finish, and it can be demonstrated to you all over the Province, because any time a manufacturer, distributor or retailer cuts the price in order to produce a sale, you can always take him out on the side street in your home town and show him the goods in a second-hand store or hardware store at half his cut price. If price is relied on for the sale customers are not going to go to him, they are going to go to the second-hand store on the side street. So on behalf of the manufacturer I urge upon you the necessity of running good sales campaigns to make the public absorb the devices offered to it. Remember last winter and the year before when power was short. It was very easy and probably essential to almost prohibit the use of devices, but I want to tell you, gentlemen, that you can't stop advertising in any form or manner and then come along later and pick up your market where you left off. I believe to-day you gentlemen should be prepared to spend six or seven times more money in advertising than you would have spent had the power shortage never developed.

Messrs. McKenzie & McLeod, telephone contractors, Regina, Sask., have been awarded the contract by the provincial Department of Telephones for the construction of a long distance telephone line from Turtleford, Sask., to St. Walburg, Sask. It is understood the contract price is \$105 per mile, the Department to furnish all materials.

Electrical Page a Valuable Medium through which to Reach the General Public

The city of Winnipeg has a wide-awake electrical organization and consequently there is a regular electrical page—every week—in one of the daily papers. Mr. Howard's article in Oct 1 issue told more about it. This page is filled with electrical consumer. A typical article in a recent "page" outlined the operating costs in Winnipeg of the various electrical appliances in the home. These figures, doubtless, were a surprise to the citizens who read them—they were so very small. Why don't we have more electrical pages? This particular item read as follows:

The following table shows the approximate operating cost of electrical appliances in Winnipeg:

Rate 3 1-3c—10% discount, 10 days—Effective rate 3c.

Appliances	Watts	Number of hours per week in use	Cost per month
Iron	660	3½	.30
Suction Sweeper	150	2	.03½
Washing Machine	250	3	.09
Dish Washer	200	5	.12
Toaster	500	2	.12
Percolator	400	3	.15
Grill or Hot Plate	660	7½	.60
Fan	50	12	.15
Sewing Machine	50	10	.06
Vibrator	30	3	.01
Portable Radiator	660	10	.80
Curling Tongs	25	3	.01
Immersion Heater	250	1	.03
Warming Pad	10	25	.03
Lamps			
Tungsten Lamp	25	20	.06
Tungsten Lamp	40	20	.09½
Tungsten Lamp	50	20	.12
Tungsten Lamp	60	20	.14½
Tungsten Lamp	100	20	.24

Cooking and Heating

Rate 1c—10% discount, 10 days.

Electrically heated iron..	3,000	3	.36
Electrical Fireplace	3,000	10	1.20
Average monthly cooking bill per family.....			2.85

This data has been compiled from 2,600 Electric Cooking accounts.

Water Heater Rates

For a 1 K.W. Heater	\$3.33 gross per month
For a 2 K.W. Heater	5.55 gross per month
For a 3 K.W. Heater	6.66 gross per month

Contracts for a one-year period will be accepted at these rates and a discount of ten per cent. will be allowed if accounts are paid within ten days after issue date.

Motion Pictures show Asbestos Mines

The Bureau of Mines, Washington, has recently completed a motion picture film showing the asbestos mines of the Johns-Manville Co. and the various factories and processes in the mining, refining and manufacture of asbestos into its numerous products, such as roofings, insulations, packings, brake linings, asbestos textiles, papers and asbestos woods and other products. The picture is in four reels and runs a little less than an hour; available for presentation by clubs, engineering societies, Y. M. C. A.'s, etc.

Messrs. Philip Lahee & Co., 3 St. Nicholas St., Montreal, Que., have secured the contract for electrical work on a school building being erected between Percival & Wolsley Avenues, near North Park St., Montreal West, at an estimated cost of \$150,000. Also on a school building to be erected on St. Urbain St., between Rachel and Marie Anne Sts., Montreal, at an estimated cost of \$500,000.

Centralized Display for the Manufacturer and Jobber

By ROBERT L. WARE

The Society for Electrical Development, Inc.

Displaying samples of the complete line of a manufacturer or jobber in such a way as to show them off to the best advantage and in such a way as to save the time of the buyer and seller, is a subject which ought to receive and is receiving more and more attention.

When a buyer calls with an idea of making selections from your line, it makes far more of an impression on him to take him to a room preferably—and a quiet one—or a section of the office or factory where every item manufactured or distributed has been collected, systematically arranged and properly displayed, than to show an item here and there, starting from the top and going to the bottom of the building in which your business is carried on.

Attractively showing your goods in a room set apart for samples only is more conducive to buying in that it gives quiet and holds the buyer's attention, as well as saving both the buyer's and the sellers' time.

Centralized display is an idea that every firm, from the manufacturer to the dealer, can give attention to with excellent results.

After setting aside a room or a light and airy section of your building for the purpose—the size of the room or space depending upon the method of display hereafter described—there are three methods of displaying your merchandise satisfactorily. We confine ourselves to these three methods because, after investigation, we find that manufacturer or jobber displays fall quite generally into three classifications. Other schemes are a variation of one of these three methods, combined at times with one or both of the others.

The three methods are (1) the glass cabinet, (2) the fixture and (3) the counter. Although the third method is self-descriptive, we give it in combination with the cabinet method as of equal interest.

The Glass Front Display Cabinet

More than 1,400 manufacturers are using the glass cabinet method such as is found in the Bush Terminal Sales Building in New York. In many instances they act as their own jobbers and sell to the dealers in special localities. The kind of article displayed here varies from candy to ready-to-wear articles. Because of the general adaptability thus actually proved by practice, there is no reason why the same glass cabinet could not be used in the electrical trade for such attractive items as percolators, chafing dishes, grills and the many other nickel and fine finished articles which make up a large part of this field of business.

That the glass cabinet is effective, is indicated by the fact that within the last two years more than 40,000 large buyers have flocked to this building to make their purchases, and up to August 28th of this year, several floors have done as much business as during the whole of 1920.

Under this scheme, display cabinets, two-thirds of the top of which consist of sliding glass doors, are aligned row after row on both sides of wide electrically lighted aisles. Glass shelves spaced according to size and height of the item hold the merchandise. Illumination is supplied by electric lamps encased in the top behind frosted glass or from tubular bulbs at the top inside the glass doors, emphasizing the articles and distinctly showing every line.

The bottom third of the majority of the cabinets is taken up with several spacious drawers and a sliding shelf is ar-

anged. In the remainder of the cabinets, in which there are no drawers, the lower third is fitted with wooden shelving and the samples placed on them protected by sliding wooden doors.

These cabinets are standardized for this building, but similar cabinets of oak or walnut can be designed to suit your requirements as to height and length. One complete unit could be purchased to start with and other units added as required. In this way a complete showroom of the very best quality and design would in time be acquired.

A "Book" of Samples

The second method of display, or the fixture plan, is that which has been used for a number of years by publishers, picture firms and many hardware firms. In the parlance of the manufacture of this fixture it is called the "Universal Displayor." This fixture is made up of any number of leaves, panels or wings hinged together at the back and swinging from a pivot like the leaf of a book. Several electrical firms have already made use of the fixture method, while many hardware jobbers and dealers have long been enthusiastic users of it.

Although the general idea back of the various models of this fixture is the same, the leaves vary in number and in size to meet the special requirements. The centre portion of the leaf is soft wood covered with green burlap, and to this leaf on both sides may be attached the items of merchandise. Shelves or guards can be fastened to the leaves to permit of the display of all bulky articles that cannot be attached. Samples can be fastened by means of screw-eyes, nails, hooks or placed on adjustable metal shelves which can be had in any depth from one to six inches.

In order to make this method of display of maximum value, items of a similar class should all be placed together on the same leaf or contingent leaf, properly headed and each given a number.

With canopy top, with rubber guards between the leaves so as to prevent contact of material on the shelves and with proper illumination, this "displayor" makes a compact and proper arrangement of many samples for ready reference. It is particularly suitable for the display of wiring devices, small fittings, etc.

Displaying on the Counter

The third method or "counter" plan is one which has been used with success by a large toilet article company for a number of years. This company, however, also uses the glass cabinet plan in conjunction with the counter method in setting off their merchandise with most attractive results. As the items are for the most part of a light color, black velvet covers the top of the counters and is placed at the back of the cabinets.

The cheaper articles and those allowed to be handled are placed on the counters each with a serial number and a set number, if it belongs to a set, while the finer items and sets and those required to be at all times clean, are kept in the glass cabinet.

In the example in mind the counters are arranged in parallel rows between the cabinets placed around the wall with aisles between the counters themselves and the counters and glass cabinets.

Whether you use any of these methods of display or a variation of them does not matter so much as the fact that you get your items of merchandise—a sample of each article—together in a room by themselves, systematically arranged and more effectively and conveniently displayed.

Centralized Display Posts Salesmen

There is still another argument in favor of the centralized display for manufacturers and jobbers which constitutes the answer to the question, "How many of your salesmen have

seen all the devices and incidentals which you manufacture or all the items which they sell?"

It would without doubt be a big satisfaction to you as the manufacturer or jobber to have everybody see and realize how many devices you produce and sell, and it would be a big advantage to have your salesmen know the whole line, although they, as individuals, may only sell a part of it

Briefly, then, a centralized display saves time, holds the buyer's attention better and accelerates buying, keeps all samples together for ready reference, protects them in the best possible way, displays them most advantageously, and brings the salesmen and many others to a realization of the number of things you manufacture and sell. For those reasons the following out of one of these suggestions or a combination of them seems to be the dictation of plain common merchandising sense

An Electric Conduit and Pipe Cleaning Device

By E. GEORGE CHEUVREUX, JR.

For many years no effective method has been employed to blow down obstructions thoroughly in pipes, particularly electrical conduits, that are placed in the walls or other positions during the construction of a building. Many of these are laid in position before the cementing or plastering is completed, and during the time that such work is being accomplished. It has not been found practical by experience to cap the ends of these pipes, although sometimes wooden plugs or waste rags are placed in the exposed ends, and oftentimes these plugs or rags or cement are forced into the tube to such an extent that when the pipe is sealed into position by the completion of the walls the pipe is practically useless, unless a great deal of labor is employed to extract these obstructions.

There is no tool made at present that can be placed in the tool kit that will work effectually against all clogging in pipes. In many cases, conduits had to be abandoned and other pipes set.

A device has been patented in the United States, however, and will probably be placed on the market in the near future, that will blow down any foreign matter in conduit,

posed ends, to which fittings are screwed. It is on these exposed threaded ends that the device is attached.

Fig. 1 shows a fitting which may be a casting finished in black enamel or galvanized, or it may have its exterior knurled. Fig. 2 shows a sectional view and details of the device. The interior of one end has screw threads (2) while the other end is reduced and provided with screw threads (3) and (4), and communicating with (2) is a small bore (5). Member (6) is similar to member (1) and is also provided with screw threads (7) into which member (1) is screwed. Member (6) is also provided with a reduced portion (8), having a longitudinal passage through which the firing pin (10) passes. The firing pin consists of a knob (12) and a firing point (11). The knob or firing plate is screwed (13) to the pin itself. The pin operates freely in the passage (9), so that there is no effective pressure until the time desired. There is also a spring used on the firing pin, so that it rebounds after discharging cartridge, but this is not shown in the sketch.

The device is operated as follows:— Member (1) is screwed to the pipe, and this member can be made any size to suit the diameter of the pipe, and can be used on two sizes of pipes by means of reducers, and also on elbows or any fitting attached to the pipe. A blank cartridge (14) of .32 calibre is then placed in the passage (5) with its flanged end resting on the face of the passage. Member (6) is then firmly screwed to this, and a blow of a hammer on the knob will explode the cartridge. The explosion in the pipe will cause sufficient pressure to blow out all foreign matter. If a single cartridge does not accomplish the work effectually, a second or even a third cartridge may be used, but as a rule it will be found that one will do the work.

The device is simple and assures absolutely clean pipes on the job, and in one instance it was used for a long length of pipe (about 200 feet) and it threw everything before it with great force.

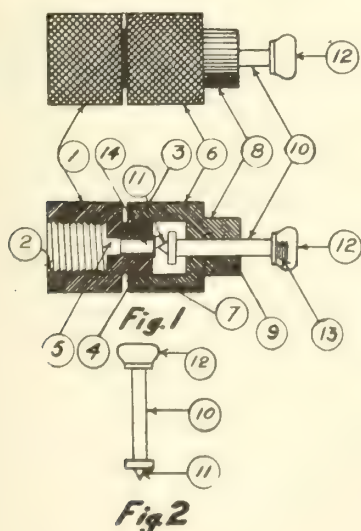
Electricity in your Home

The Electrical Co Operative Association, Province of Quebec, has given another evidence of its virility in the publication of an attractive booklet under the title "The Comforts and Conveniences of Electricity in Your Home." This booklet outlines, first, the necessity of proper wiring so that electrical appliances of various kinds may be used with comfort, convenience and economy. Each room in the home has been treated—living room, dining room, music room, kitchen, laundry, cellar, billiard room, sewing room, attic, bedroom, nursery, bathroom, hall and porches—helpful suggestions being given in each case covering the installations necessary to make the home modern. Considerable space is then given over to lighting, explanations being included regarding the various types of lighting, the use of shades, globes and reflectors; the meaning and amount of absorption; the effect of colored wall surfaces. Finally, electrical appliances are illustrated and their uses and conveniences explained in order.

The booklet is printed in both languages, each descriptive item being arranged, first in English and then in French. It is an exceedingly attractive booklet and we understand is being widely distributed among central station customers; one company alone, we are told, is distributing 10,000 copies.

Educational work of this nature and magnitude must soon be reflected in a greatly increased activity in the demand for electrical appliances.

Gelinas & Pennock, Reg'd, have been appointed Eastern Canadian representatives for the Simplex Electric Heating Co., of Cambridge, Mass.



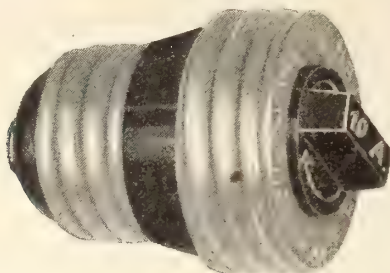
such as wooden plugs, waste, cement, plaster, even ice, and on a test it blew through 200 feet of conduit, around elbows, carrying before it all material in the tube.

The principle of the device is concussion and the tool itself is simple in construction, easily handled and safe. Conduit is usually provided with screw threads on the ex-

New Electrical Equipment

The Repeater Fuse

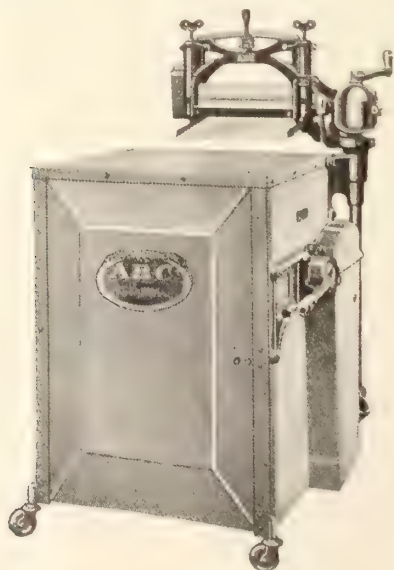
A new type of fuse plug, known as the "Repeater—6" has been placed on the market. This plug gives the same kind of service as an ordinary plug, only six times as much, since it combines six fuses in one and when a fuse blows it is only necessary to turn a button to the right—just like a snap switch—and your line is re-fused. This new



appliance is manufactured by the Moss-Schury Manufacturing Company of Detroit, and seems to open a wide field for the contractor and the dealer. It is claimed that it can be sold for little more than the ordinary fuse plug. Another feature is that in the event of the six fuses becoming burned out—which is very unlikely—refillers can readily be obtained. This fuse plug is made in seven amperages ranging from 6 to 30 at a standard voltage of 125.

1922 Model A B C Washer

The new 1922 model of the A B C Electric Laundress is announced by the makers, Altorfer Bros. Company of Peoria, Ill., to embody no less than 24 refinements in construction. New features include an aluminum wringer with two-spring tension, 12" rolls; instantaneous safety release and nicked adjustable aluminum drain board; an improved wringer control mechanism with positive locking device that automatically locks the wringer in any of 20 different positions; the use of machine cut gears throughout; a threaded drain spout set at a 45 deg. angle; a sediment drain groove in bottom of tub; the use of aluminum rivets to



attach tub to frame; a nutmeg push button switch; large pressed steel, quiet casters; spring latch on cylinder cover; one-piece snug-fitting, non-warpage cover on cabinet; nickel plated operating handles; one-piece "cord tire" belt; oil grooves in main gear case bearings; lock nuts on set screws to preserve alignments of shafting. The motor is $\frac{1}{4}$ h.p.

Wringer is detachable to permit attaching and driving the A B C Electric Ironer without use of a motor on the ironer. Zinc or maple cylinders are optional.

Easiest Way Washing Machine

The Easiest Way washing machine, manufactured in Sandusky, Ohio, is a sturdy mechanism which depends upon the rocker motion for its effectiveness. It has a heavy copper tub with slotted bottom whose shape swirls the water through the clothes in a "double-somersault" motion. Features of construction claimed by the manufacturer include—a wringer roll starting, stopping and reversing lever; a swinging wringer locking lever which locks in any position; a



tub control lever; compression leak-proof drain; belt tightener; balancing springs for the tub; safety release on wringer; $\frac{1}{2}$ inch rubber rolls; an unusually strong one-piece frame; friction clutch; oil-less bearings; and large swivel casters. It is equipped with a $\frac{1}{4}$ horsepower Westinghouse splash-proof motor. The machines are made in three designs, one totally enclosed, one partly enclosed and the other open. It sells under a one-year replacement guarantee.

Gold Medal to Canadian Manufacturer

The gold medal for the best farm lighting plant was awarded to Dominion Light at the Provincial Exposition recently held in Quebec. Dominion Light is manufactured in Canada by the Dominion Steel Products Company, Limited at Brantford, Ontario. The story of Dominion Light has been the story of the quality idea. From the time the first plant was built nothing but the best materials and the most careful workmanship have gone into its construction. As a result Dominion Light has gained a reputation for low upkeep and freedom from repairs among its users. Another feature of Dominion Light that makes for long life is the continuous overload capacity of twenty per cent or more. This gives ability to take care of unusual loads without putting an excessive strain on the plant. The selection of Dominion Light by the Provincial Exposition officials shows that Canada is able to manufacture products of the highest quality capable of giving continuous satisfactory service.

Schweitzer & Conrad, Inc., Chicago, have distributed an interesting bulletin, No. 106-A, entitled "Simplified Protective Combinations." The bulletin is well illustrated.

The Hyrate Gripper

A convenient and up-to-date method of holding either a jar or a battery solidly is readily provided by the Hyrate battery and jar gripper, shown in illustration, which is



readily adjusted to fit any size of battery, made of high grade steel, and will last a lifetime. It does the work quickly and reduces danger of breakage, and saves labor and expense. It is manufactured by the Service Station Supply Company, Detroit.

Canadian Edison Appliance Exhibit

Due to an oversight, our article in our October 1 issue, entitled "Electricity at the Canadian National", failed to mention the splendid display of the Canadian Edison Appliance Company. This exhibit included all the well known appliances of this company. Hughes electric ranges, water heaters, and other supplementary equipment gave the result of producing a most complete exhibit of electrical devices for the home—an exhibit marked by its simple and artistic arrangement. Housewives seemed particularly interested in a completely appointed tea table, which was a very interesting feature of the display, showing the wonderful results of electric cooking. A cooking demonstration was continuously carried on. The invariable question of



Kenneth A. McIntyre, who has been appointed Canadian Representative of the S. E. D.

the visitor was "How can I get those things into my home?" This is the question the electrical industry is called upon to answer. Why do we talk of depression when the field is so ample and the demand so great?

A Eureka "Drive"

The Eureka Vacuum Cleaner Company have been holding a very interesting "drive" in which they set themselves the task of selling 40,000 Eureka's in four weeks. Prizes to the extent to some \$30,000 in cash are available to dealers throughout the continent. The basis on which Eureka's were sold during this campaign were: 10 days free trial, \$5.00 down and small succeeding payments. At the same time the company offered a number of cash prizes for the best window trims submitted in connection with the sales drive.



A Disastrous Fire did not Quench the Ardent Enthusiasm of that Personification of Merchandising Efficiency, G. E. B. Grinyer, Guelph, Ont.

From the Ashes of his First Efforts have arisen a Greater Enthusiasm and a Keener Appreciation of the Value of Quality, Service and Co-operation.

This is Mr. Grinyer's finest Window Effort since the fire. It took Two Days to arrange—Two Days Well Spent.



Electric Railways

The Future of the Track-less or Rail-less Trolley Car

The Toronto Transportation Commission already are trying out, with apparent success, a number of double deck buses and, in addition, are considering experimenting with the "trackless" trolley bus. Conditions in Toronto seem to be favorable in certain suburban sections for the operation of this type of car.

The operation of the trackless trolley, like that of the motor bus, is an unknown quantity in our northern localities. There is not much question but that they will both be satisfactory during the summer, but a snow fall of two or three feet with drifting, below zero, conditions may make the operation of either of them well nigh impossible. However, manufacturers of rolling stock on this continent are making experiments, and one of these is described in the current issue of the Electric Railway Journal, which states that after an exhaustive study, of existing vehicles begun some months ago the officers of the J. G. Brill Company recently started experimenting for the purpose of developing a type of "rail-less" car which in their opinion would meet the requirements of the transit interests of this continent. These requirements called for furnishing economical transportation under more or less special conditions. A short 600-volt d.c. double-wire line was ultimately erected in the Philadelphia plant and an experimental vehicle constructed.

Current Collector and Control System

These experiments made it apparent that the success of the vehicle depended primarily on the overhead current collector and the control apparatus. Several different types of current collectors were tried but in each case were found unsuitable. The design of the collector last developed and which apparently will give the best results has two underwire sliding shoes with grooves which engage the two overhead wires when directly over the centre of the car. This device ingeniously includes a series of pivots which facilitate action in every direction, longitudinal, vertical and horizontal, as the "rail-less" car deviates from a path directly under the wires. A wooden trolley pole 19 ft. long is used in conjunction with a standard trolley base arranged to exert a total spring pressure of 38 lb. on the two overhead wires. This pressure has been found to be sufficient to keep both shoes of the collector in position as long as the car is not more than 16 ft. off centre.

All electrical equipment controlling the 600-volt power current is located underneath the car body. Therefore, in case of a blowout in the electrical equipment there is less liability of danger to passengers. The current relay contactor system, designed by Cutler-Hammer Company, is operated by a foot master controller, located on the floor in front of the driver's seat, and interlocked with a reversing switch.

Either one or two 25-hp. motors, connected in tandem, such as used on standard safety cars, may be used on this vehicle, as the contemplated service requires. Such motor equipment permits operation at a maximum speed of from 25 to 30 m.p.h. Motors are mounted directly on the chassis frame and drive the rear wheels through a propeller shaft. A Sheldon rear end worm drive is used.

Overman cushion tires are used throughout. Those on the rear wheels are of the dual type. Both the service and emergency brakes are of the internal expanding type, the former being operated by a pedal under the driver's right foot and the latter by a brake handle near his right hand. The chassis and steering arrangement permit the turning of this car within a diameter of 40 ft. without disengaging the current collector from the wires.

In designing this "rail-less" car body particular attention was paid to developing one of substantial construction which would be suitable for rail-less service. A composite underframe was built with the side sills of yellow pine, the end sills of oak and the crossings of suitable steel channels securely tied together with steel angle brackets. This underframe is firmly attached to the chassis. The corner and side posts and the belt rail are of ash with poplar letter panels, all sheathed on the outside with No. 18 sheet steel.

The plain arch roof is supported on wooden rafters augmented by three steel rafters. Four Brill exhaust ventilators are mounted on the roof.

The two-leaf folding service door, 29 in. wide, on the forward right hand side is manually operated by a suitable handle near the driver's left hand. In opening, this door folds outwardly against the body corner post. Stationary double steps are provided at this door opening. An emergency door, 22 in. wide, is located in the centre of the rear end of the body with a hinged step which drops into position when this door is opened. All side and rear windows are fitted with single sash which drop into pockets. This reduces the weight of the car at the roof and lowers the centre of gravity.

Another innovation included in this "rail-less" car is a driver's seat, the back of which may be adjusted by means of a simple mechanism to suit the leg length of the operator. Seating accommodations for twenty-eight passengers are provided. A transverse seat extends completely across the rear end with a single movable section which folds against the emergency door, a longitudinal seat along the two rear windows on each side of the aisle, four cross seats with 32-in. cushions, a longitudinal seat for two passengers on the right-hand side next to the door opening and a single longitudinal seat behind the driver, all of the stationary type. Figuring 2.5 sq. ft. per passenger the maximum capacity of the bus is fifty passengers. With twenty-eight seats this gives twenty-two standees. The aisle width between the cross seats is 17 in. Three pipe stanchions between the longitudinal seats at the rear are provided for the use of standing passengers.

Messrs. I. A. Bennett Company, 112 W. Adams St., Chicago, Illinois, have been appointed exclusive sales representatives for the States of Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, and the Upper Peninsula, Mich., for the Ajax Electric Specialty Company.

We are pleased to announce that after an absence of over one year from business, on account of ill-health, Mr. G. W. Budden, of Budden, Beard and Co., Calgary, has returned to his home, feeling quite a different man. He has spent the last year in the State of New York, where he was taking medical treatment.

Conductors and Motormen in the Making

By F. D. BURPEE

General Manager O. E. R. Co., in Electric Traction

Making Conductors and Motormen

The car was crowded. The conductor observed an elderly gentleman standing in the middle of the throng with a pipe in his mouth. He thought he saw a puff of smoke. Being a conscientious conductor who always tries to carry out the regulations, he worked his way forward, touched the gentleman on the arm, and said, "Smoking is not permitted on this car, Sir." The old gentleman being in a crusty mood, made a point as he left the car of speaking to the conductor.

"I was not smoking, nor was my pipe."

"I saw you smoking."

"I tell you I was not smoking. There is no rule to prevent me keeping my pipe in my mouth, is there?"

"I suppose I'm a liar then."

"I suppose you are if you say so."

"You're a liar yourself."

The next day the manager received a letter from the passenger reporting the incident, and charging the conductor with gross incivility in jostling him, accusing him falsely, and calling him down before a crowd.

This conductor is an old employe, honest, painstaking reliable, but he has not yet learned that an unreasonable passenger should be regarded in the same light as binding brakes, a bucking motor, a traffic blockade, or any other of the hundred small difficulties that carmen have to contend with and control daily. Had he replied, "Sorry Sir, my mistake, I thought you were smoking," the passenger's wounded feelings would have been soothed, and that would have been the end of it.

Friendship of Public Imperative

Incidents of this kind are too common on most street railways, and help to keep alive that old feeling of hostility that we are all so anxious to remove. Surely it is possible to train our representatives on the cars to deal with such cases in a way that will not be offensive to our customers. Much has been written lately of the importance of cultivating the sympathetic regard of our patrons. If we are going to make a success of this business of serving the public, their friendship is not merely important; it is imperative.

Wages Now Adequate to Secure Good Men

I have heard a street railway executive say, "If you propose to make expert salesmen out of conductors you will have to be prepared to pay them expert salesmen's wages." It cannot be expected, nor is it desired that we train conductors to do the work of high-class salesmen, but there is no reason why we cannot follow the example of up-to-date departmental stores, who insist that customers must always be treated politely no matter how unreasonable they may be. Work on street cars, compared with many other occupations, is clean, easy and interesting. There are no slack times during which thousands are laid off. Any man who earnestly tries to carry out the regulations and policy of the company can look upon his job as a permanent one. If you take the trouble to compare the yearly earnings of street car men with those of retail store clerks, and indeed many skilled trades, you will find that they are generally higher.

Choose and Develop Men Intelligently

In the old days we were content to take anything in the way of a man, generally to please Alderman So-and-So, and made him a conductor or a motorman without any regard for his fitness for the job. Careful selection in the engage-

ment of new men will save endless trouble later on.

Car men should, first of all, be intelligently chosen, with a view to their temperamental and physical fitness; their preliminary training should be carefully planned; and their subsequent training should last as long as they are in our employ. There are a few men on every road who might be considered almost one hundred per cent efficient, but very few. The vast majority, therefore, can be developed if we can find the right way to do it.

Qualities to Seek

What should we look for in applicants for the positions of conductors and motormen, and are the same qualities needed in both occupations? Honesty, health and fair intelligence are required for both. After that we must begin to specialize. For the position of conductor we should seek men of pleasing personality, nervous energy, and mental alertness; while motormen should be men of more stolid character—not stupid, but cool and self-contained. During the war it was found in European countries that women made excellent conductors, but, except in a few rare cases were total failures as motormen. They lacked the imperturbability, so desirable in that occupation. We can hardly hope to make the preliminary training of new men very thorough, principally because no man in the short time available can absorb the instruction necessary to make him efficient. He requires practical experience on the cars before he can assimilate it.

Training Should be Continuous

The purpose of this article is to point out the importance of continuous training after the new man has been accepted and starts to work. Bad habits are formed through ignorance because they appear to be the easiest way, and once formed are hard to change. The new man can be shown that proper methods of operation, the result of years of study and experience, once adopted, become fixed and demand no more effort.

Anyone who tries out power-saving devices will be surprised to find that some motormen whom he had regarded as his topnotchers have the worst records for wasting power, and are hardest to change, even though the most efficient operating practice is easiest on the motorman, both mentally and physically. Their failure is as much a rebuke to the management as to themselves, for their general records show they have the stuff in them.

Weeding Out is Necessary and Opportune

At the present time we are being besieged with applications for employment, and are in a position to pick and choose. Now is the time to carefully select our new men, and improve our old ones, weeding out the incorrigibles where necessary.

The methods adopted to improve the practice of our old hands must be worked out by each manager for his own system. He may find he has to change the ideas of his supervisory staff first. A remodelling of the methods of training, the publication of a company magazine or leaflet, and most important of all, personal observation and tactful correction by inspectors, are suggestions that may be found useful.

Courtesy is the Foundation

Perhaps you may think too much stress has been laid on courtesy, but I do not think that is possible. Pleasant relations with our customers make every one's work easier from the manager down. He and his staff must set the example in all dealings with the public and employes. The day of the "big stick" is gone. Each passenger is a potential friend or enemy. As to which he becomes depends on the treatment he receives in his dealings with the company. Unceasing politeness under all circumstances should therefore be a condition of employment.

POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 652, Electrical News, Toronto. 17-1f

FOR SALE

Largest electrical and storage battery business in Northern Saskatchewan. Annual turnover \$80,000.00.

19-24 Apply 319, G. North,
Saskatoon, Sask.

Los Angeles Aqueduct Irrigates Large Area

Many extensions have been made in recent years to the pressure pipe irrigation system in the San Fernando Valley, which is supplied by water from the Los Angeles aqueduct. There is now under irrigation in this valley about 76,000 acres, or seven-eighths of the area that could be irrigated by canals from the aqueduct supply. In addition to extending the pipe system, various means for increasing storage capacity have been employed to offset the demand for an excessively large volume of water at certain times of the year. Encino reservoir, which is under construction on the south side of the valley above

the main canal, will hold about 3,000 acre-feet. On the Westgate project the Stone Canyon tunnel has been driven from the south portal to within 50 ft. of completion, and the Stone Canyon dam, to store 7,000 acre-feet, is well under way. Numerous small reservoirs are planned to take the night flow and give local storage for use in daylight hours.

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	No.	H.P.	Phase	Cycle	Volts	Speed	Maker
Used 1	100	3	25	550	710	Wagner	
" 1	75	3	25	550	480	Westg.	
" 1	60	3	25	550	750	Cr. Wh.	
New 2	52	3	25	550	720	Lanc.	
Used 1	50	3	60	550	970	Westg.	
Used 2	50	3	25	550	720	Westg.	
New 2	35	3	25	550	720	Westg.	
Used 1	30	3	25	550	1500	Tor. & Hm	
" 2	30	3	25	550	750	F.M.	
Used 1	25	3	25	550	750	C. G. E.	
New 1	25	3	25	550	715	Lanc.	
New 1	15	3	25	550	1450	Westg.	
" 1	15	3	25	550	750	Lincoln	
" 3	15	3	25	550	720	Westg.	
New 2	13	3	25	550	700	Lanc.	
Used 1	7½	3	25	220	1500	Tor. & Hm	
" 1	7½	3	25	550	1450	C.G.E.	
New 1	7½	3	25	550	725	Westg.	
Used 1	7½	3	25	550	700	Lanc.	
New 1	5	3	25	550	1440	Excelsior	
Used 1	5	3	60	200	1120	Westg.	
New 3	3	3	25	550	1500	Lanc.	
" 4	3	3	25	550	1400	Westg.	
" 4	3	3	25	550	1400	Excelsior	
Used 1	2	1	60	110	1750	Wagner	
New 2	2	3	25	550	1500	Lanc.	
New 2	2	3	25	550	1440	Excelsior	
" 2	2	3	25	550	1425	Lanc.	
New 1	2	1	25	110	1400	Wagner	
" 1	1½	1	25	110	1420	Wagner	
New 1	1	1	60	110	1725	Wagner	
Used 1	1	3	25	220	1500	Tor. & Hm	
Used 1	1	1	25	110	1460	Wagner	
New 1	1	1	25	110	1440	Wagner	
" 1	1	3	25	550	1425	Lanc.	
Used 1	1	3	25	220	710	C. G. E.	

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- 3 ½ hp. 1200 rev. clutch type T.H.E.
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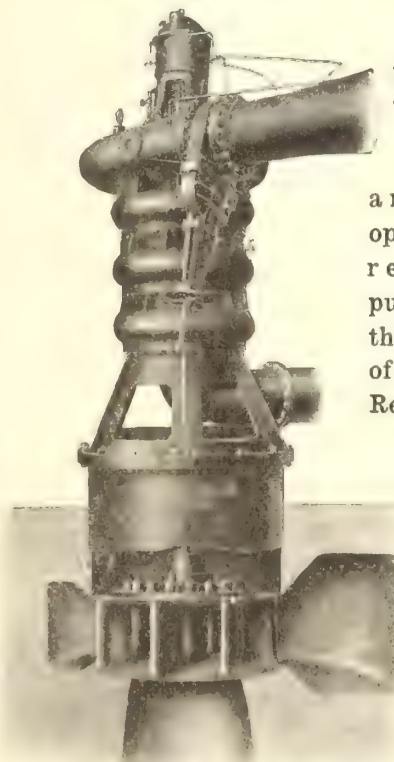
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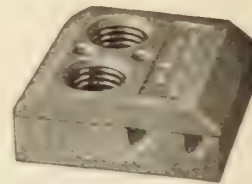
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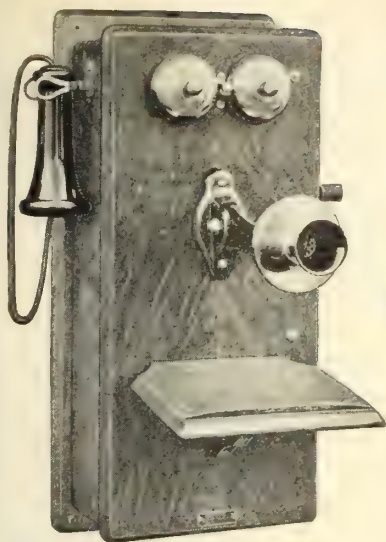
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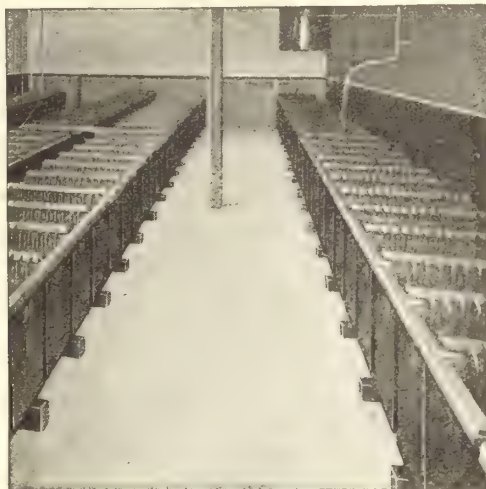
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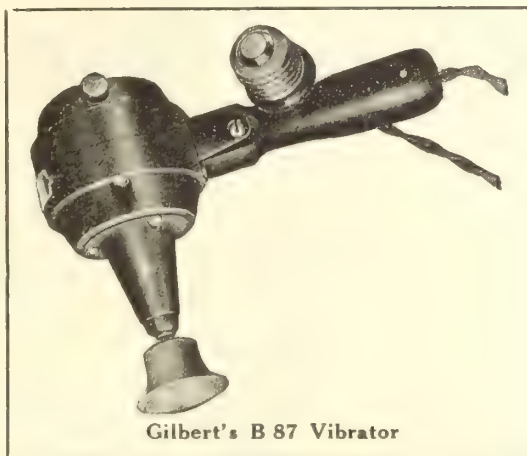
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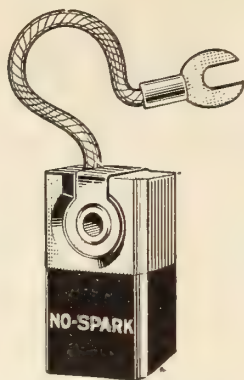
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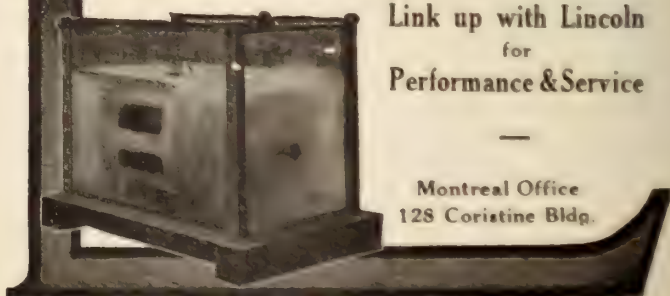
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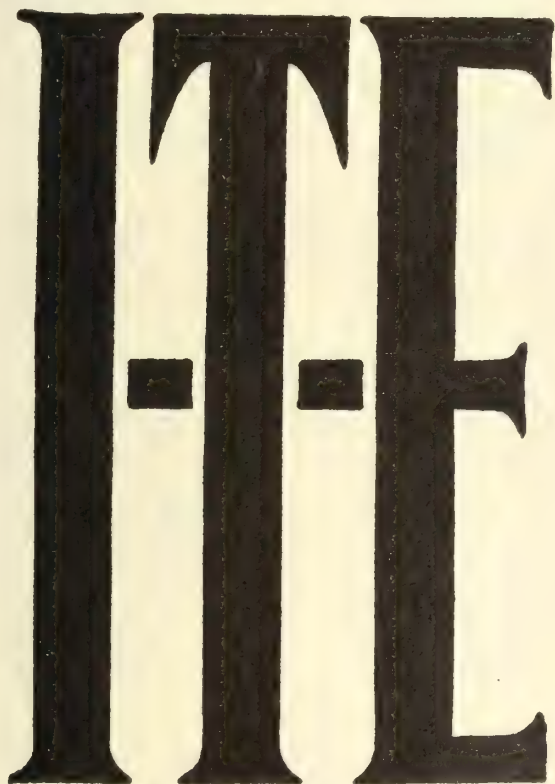
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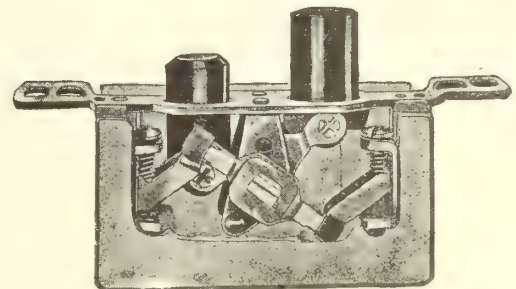
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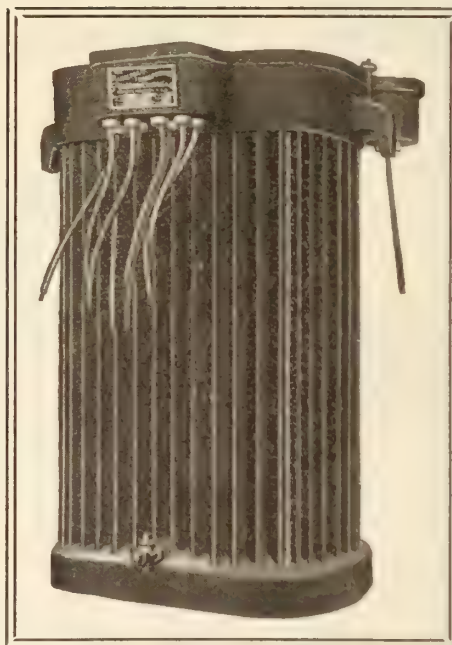
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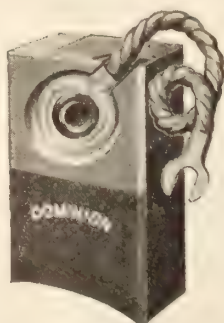
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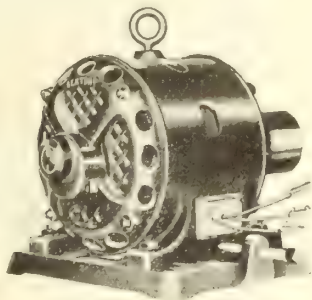
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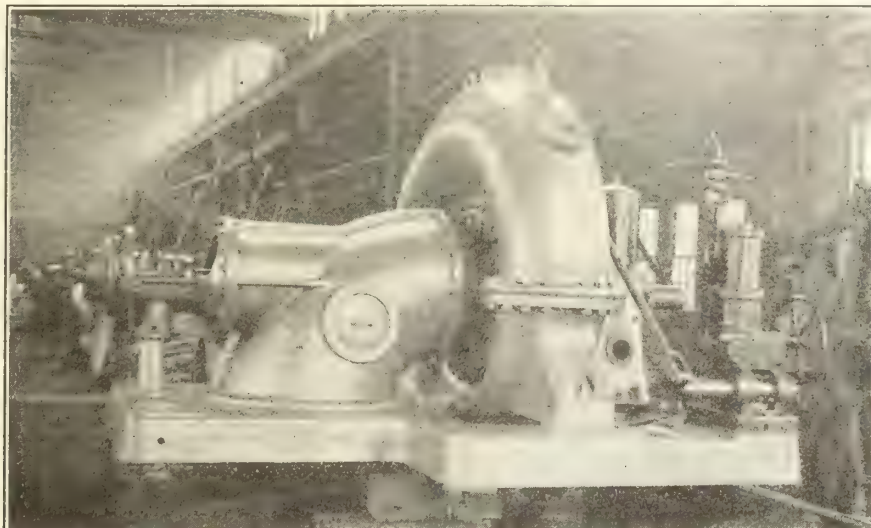
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Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, published in 1917 by McGraw-Hill Co., Inc. 285 pages, illustrated. Price \$2.50.

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"Storage Batteries," by C. J. Hawkes, 157 pages, illustrated, published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.

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Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.

"Theory and Calculation of Transient Electric Phenomena and Oscillations," by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.

The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.

The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.

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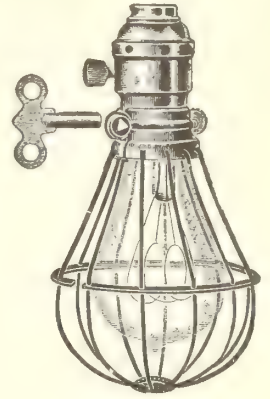
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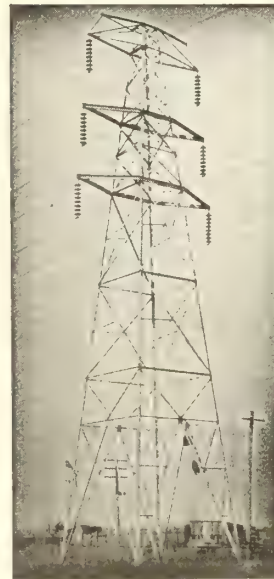
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Solderless-Tapeless
Wire Connectors

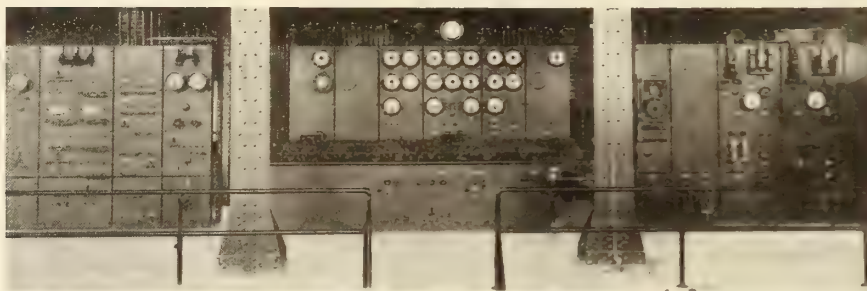
G. W. Axtell & Company
Sarnia Ont.

Westinghouse

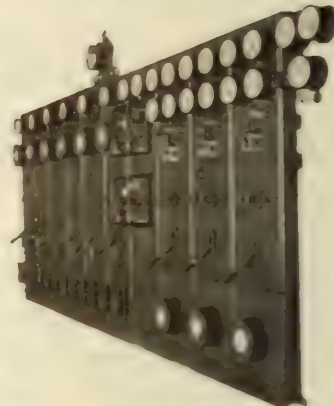
- - SWITCHBOARDS - -



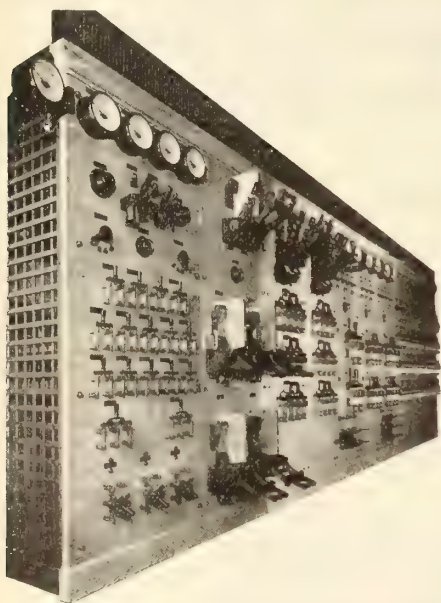
Signal Pedestal



Hydro-Elec. Power Commission of Ontario, Healy Falls—Part of Switchboard



Man. Gov't Hospital Switchboard



Dominion Parliament, Ottawa, Switchboard

Westinghouse Switchboards

The switchboard and its controls may be termed the brain and nervous system of the power plant, indicating, controlling and correcting conditions in all parts of the system.

The design of the switchboard, in the broad sense, is intimately connected with the layout and electrical design of the plant as a whole.

The proper consideration and appreciation of the numerous factors involved, calls for special engineering skill and experience, and the materials and workmanship employed in construction should be of the best.

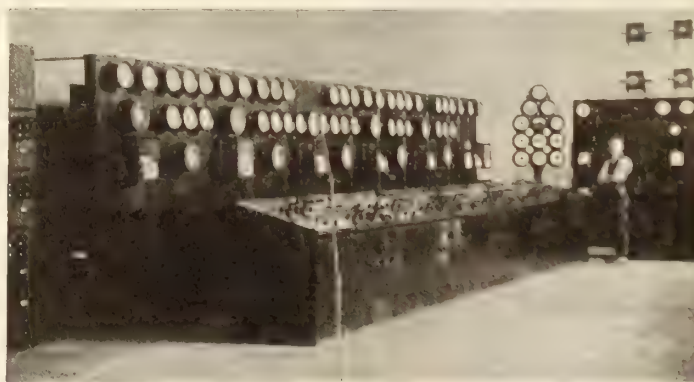
Since pioneer days in the electrical industry the name Westinghouse has been associated with leadership in this field, and in Westinghouse equipment to-day the purchaser obtains the benefit of the engineering skill and manufacturing knowledge gained in the design and installation of thousands of switchboards and control equipment for all classes of service.



Contactor Panels, first Automatic Sub-station in Canada. Toronto Transportation Comm'n



Sub-station, Toronto Trans. Comm.



Laurentide Power Co.—Corner of Control Room



Control Pedestal

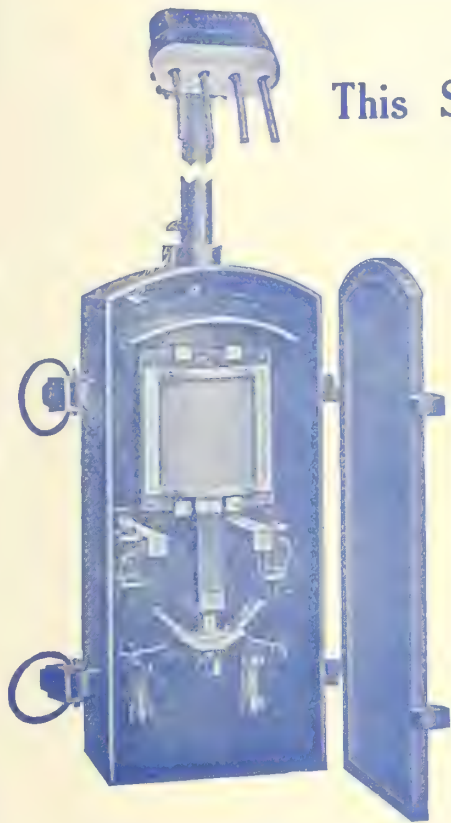
Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd
WINNIPEG, 158 Postage Ave. E
EDMONTON, 211 McLeod Bldg.





This **SOLENOID SWITCH** has been adopted
by the Hydro Electric Commission
They use it for
STREET LIGHTING

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

Write for complete descriptive particulars

The **Electrical Maintenance & Repairs**
Company, Limited

Phone
Adelaide
902-903

162 Adelaide Street West
TORONTO

Nights
Beach
1723-1930

XCELADUCT

Approved by the Hydro-Electric Commission of Ontario
Labelled under supervision of Underwriters' Laboratories

Made in Canada
Conduit

Electrical Wiring
Made Safe

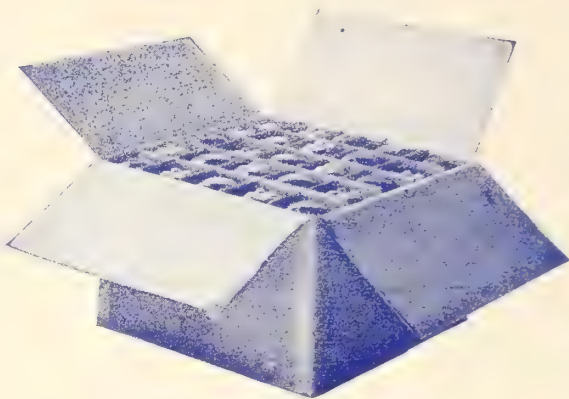
For All
Electrical
Installations

National Conduit Co., Limited
Toronto

GALVANIZED

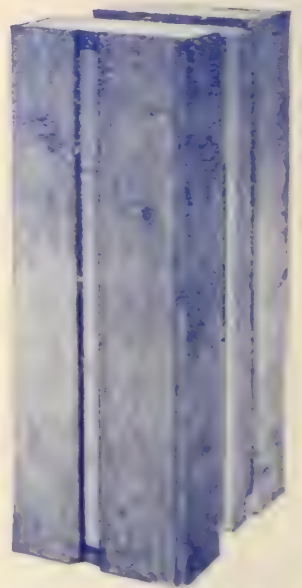
Sales Agents for Manitoba and Saskatchewan—Filer-Smith Machinery Co., Limited, Winnipeg.

White's Porcelain Strain Insulators



STANDARD CARTON

We are now packing our
insulators in cartons.
No mussy sawdust.
No breaking.
Easily Counted.
Easier handled and stock-
ed.



STANDARD PACKAGE

Try some of our insulators—They all have a very uniform brown glaze, a very distinctive color, no black spots or discoloration.

T. C. WHITE ELECTRICAL SUPPLY COMPANY

1122 PINE STREET, ST. LOUIS, MO.

Our Newspaper Campaign has developed an increased demand for:—



C-6 Range

National
ELECTRIC
Appliances



A-4 Range

ARE YOU GETTING YOUR SHARE OF THIS BUSINESS?



EO5 Range

The National Electric Heating Company

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LIMITED

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52 Albert St., Winnipeg



One Burner Hot Plate



Two Burner Hot Plate



Water Heater

Electrical

News

Engineering Contracting Merchandising Transportation

Northern Electric
QUALITY

When the Northern Electric stamp an article, that stamp is as true as the stamp on the coins of the realm.

Ask our nearest Branch House for particulars.



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LIMITED

Montreal
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Hamilton

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Windsor
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Calgary

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Condulets



Conduit Fittings



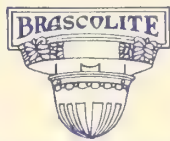
Wiring Devices



Square D Safety Switches



Flashlights



Lighting Fixtures



Indicating Instruments



Protective Switching Apparatus



Graphic Instruments



Electric Signal Apparatus



THE KEY TO SAFETY

Trade-marks Representing Quality Products

IT GIVES us genuine satisfaction to be associated with the companies represented by these well-known trade-marks.

Each trade-mark stands for a quality product of the highest grade that has long since established its worth wherever electrical work is done.



Electrical Apparatus



Wheeler & Pritchard



Switchboard & Protection Apparatus



Central Apparatus



Wiring Devices



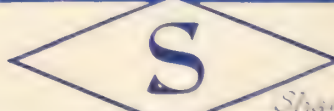
Superior Wiring Device

Northern Electric Company LIMITED

MONTREAL OTTAWA WINDSOR CALGARY
HALIFAX TORONTO WINNIPEG EDMONTON
QUEBEC HAMILTON LONDON REGINA VANCOUVER



Wiring Devices

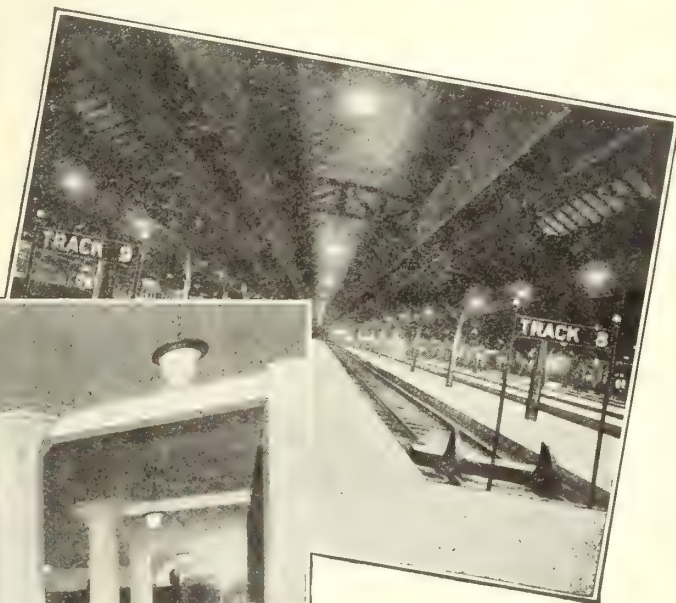


Shunt Poles

For Better Illumination



Lighting Installation
in St. Andrew's
Curling Rink
Montreal



Lighting Installation
in Windsor Station
Montreal



Brascolites in Cleghorn & Beattie's Furniture Store, Ottawa, Ont.

These Installations solved three problems of Correct Lighting

Your territory teems with unsolved lighting problems. Many factories, offices, stores, hotels, churches, theatres and other public buildings are victims of defective illumination. New buildings are constantly being erected. Every lighting prospect has its own peculiarities, to meet which a variety of fixtures are designed. It becomes a question of correct application. Let our illumination specialists assist you in deciding the form of lighting best adapted to your clients' needs.

Write our nearest house

Northern Electric Company

LIMITED

Montreal Quebec Toronto London Regina Edmonton
Halifax Ottawa Hamilton Windsor Winnipeg Calgary Vancouver

ANNOUNCING—



THE NEW HIGHLY EFFICIENT GLASS FOR LIGHTING

Sol-lux Glass is a new discovery of the Jefferson Factory and will meet and surpass any lighting tests or comparisons with the highest qualities of white glassware.

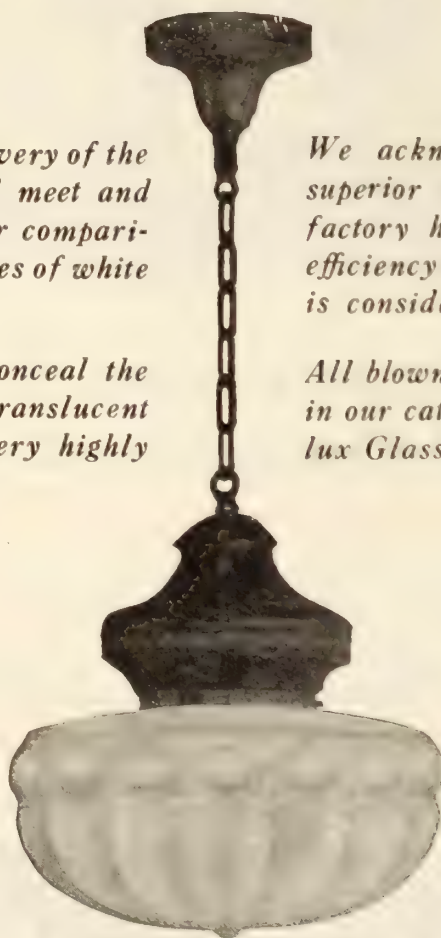
It is just dense enough to conceal the source of light and yet translucent enough to be classed as very highly efficient.

We acknowledge Sol-lux to be far superior to any production of our factory heretofore and feel that the efficiency and completeness of our line is considerably bettered.

All blown lighting pieces illustrated in our catalogues may be had in Sol-lux Glass by specifying same.

WRITE FOR
PRICES

SAMPLES NOW
READY



JEFFERSON GLASS COMPANY, Limited

DOWN-TOWN SHOWROOMS—164 Bay St., Toronto
FACTORY AND HEAD OFFICE—388 Carlaw Avenue,
Toronto

285 Beaver Hall Hill, Montreal
272 Main St., Winnipeg
510 Hastings St. West, Vancouver

Water-\$1000 a drop

When water can cost as much as \$1000 a drop in damage done to transformers it is wise to buy a watertight service box. The "Noark" Service Box is watertight, preventing ground and burnouts, because it is made only of the highest grade castings, fitted with watertight, gastight gaskets.

No extra knife switch

The "Noark" Service Box is both cutout cabinet and knife switch. The fuses themselves are the switch blades.

A quarter turn of the cover handle engages the fuses so they are automatically pulled from the clips when the cover is lowered.

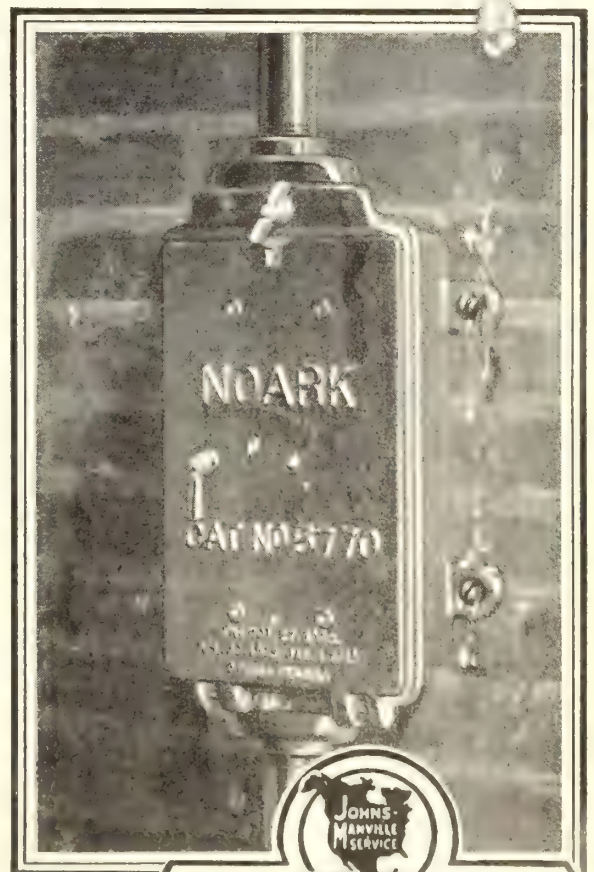
Or, if desired, the cover may be lowered without opening the circuit.

Suggestion: For complete protection fuse the "Noark" Service Box with "Noark" fuses.

All "Noark" Service Boxes are approved by the Underwriters' Laboratories, Inc. and the Associated Factory Mutual Fire Insurance Companies, both as to cutouts and switches.

CANADIAN JOHNS-MANVILLE CO. LTD.

Montreal Winnipeg Vancouver Windsor
Hamilton Ottawa



COVERS
THE CONTINENT

Through—

Asbestos

and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High
Temperature Cements,
Asbestos Roofings,
Packings, Brake
Linings, Fire
Prevention
Products

JOHNS-MANVILLE ELECTRICAL MATERIALS



Antique Gold or
Antique Bronze
Finish. Two
lights. Shade of
metal overlay and
amber glass.

Height 22 inches.

Catalogue No. L. 2600



A Winner From the Word Go

MODERATE in price, beautiful in design, this Miller Library Lamp is distinctive enough for a mansion, yet within the means of all.

For a quick mover, we can conscientiously recommend this lamp. The extremely reasonable price coupled with its charming appearance combine to make a real business-getter.

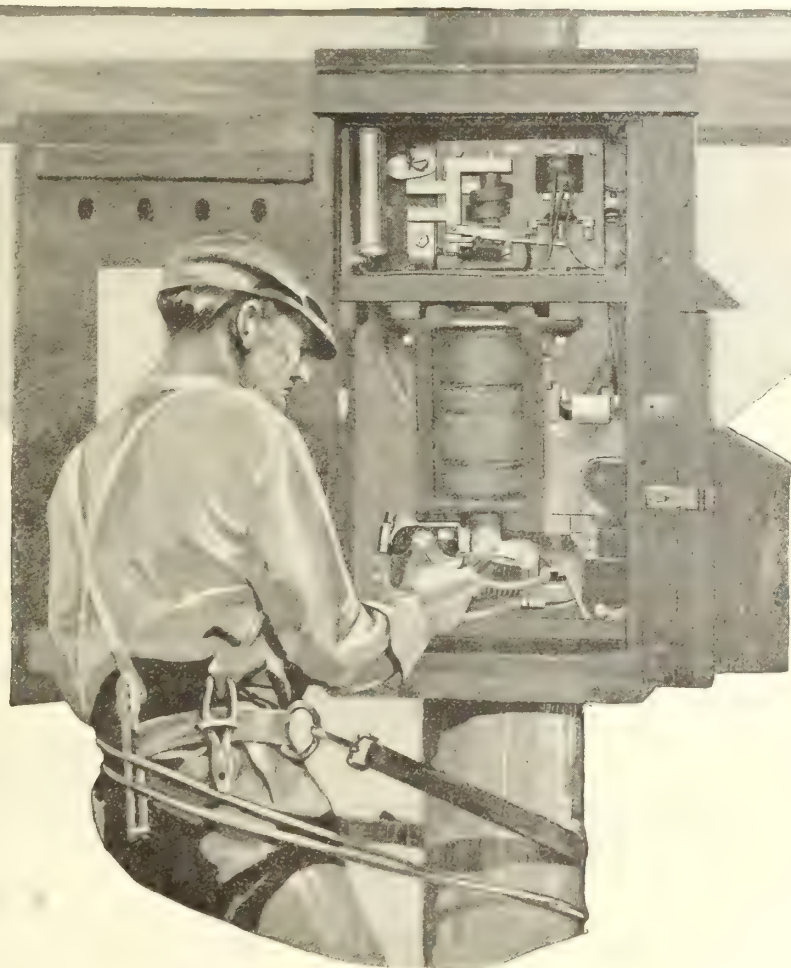
Portable Lamps make a very seasonable window display at this time of the year. Our district office you do business with, will be more than pleased to make suggestions and render every assistance.

Canadian General Electric Co., Limited

HEAD OFFICE  TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

When traffic for any reason makes heavy demands in one section, the feeder system should be ready to meet the power requirements



C.-G.-E.
Automatic
Sectionalizing
Switch


Connected directly across the section insulator the C.G.E. Automatic Sectionalizing Switch links up adjacent feeder sections increasing current capacity and equalizing voltages. In case of a short circuit, it automatically opens, and will not close until the line is again free from trouble.

Such an automatic switchman guarding each section of your feeder copper gives

you all the benefits of an uninterrupted network of feeders, supplies current as needed and gets the highest possible efficiency. In case of trouble at any point the affected section will be cut out immediately and when the trouble is removed, will be switched into the net work again—and IT'S ALL DONE AUTOMATICALLY.

Our nearest sales branch will gladly supply you with full particulars.

Canadian General Electric Co., Limited

HEAD OFFICE  TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

HIGH**"ELPECO"
LINES****TENSION****Ammeter Switches****Bus Bar Clamps****Bus Supports**

(For Indoor and Outdoor Service)

Choke Coils

(For Indoor and Outdoor Service)

Control Switches

(Remote Control)

Copper Fittings

(Cast and Tube)

**Disconnecting Switches**

(For Indoor and Outdoor Service)

Insulator Pins**Outdoor Sub-Stations****Pole Top Switches****Power Factor Switches****Special Fittings****Switchboard Structural Devices and Fittings****Switchboards**

(A. C. and D. C.)

"Quality Shines Through the 'Elpeco' Lines"***Represented in Canada by*****Ferranti Meter and Transformer Mfg. Co., Limited****Toronto****Montreal****Winnipeg****Halifax****Timmins****Calgary*****Write to Our Nearest Office. Bulletins, Prices and Information on request.******"When Dreams Come True"*****Introducing—THE KID
The Last Word in Meters!*****Small, but equal to the job.******Special Features***

Light weight, only 4 lbs. Portable. Compact. Pressed Steel Case and Cover. All parts easily removed. Accessibility. Cam Type Self-locking Adjustments with Graduated Scales for Light Load, Full Load and Inductive Load. No Unnecessary Screws. Very easily and quickly Calibrated. Wall Fixing Wood Screw provided as part of Meter.

Type F. D. Integrating Watthour Meter.

Shipments from Toronto Stock. The most up to date meter on the market

**SCALE 1/2 SIZE****Ferranti Meter and Transformer Mfg. Co., Limited****Toronto****Montreal****Winnipeg****Halifax****Timmins****Calgary**

Galvaduct



A Galvaduct Building

**New Northern Aluminum Building, Stirling Road, Toronto
Archibald & Holmes, Contractors**

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Loricated

Always specify GALVADUCT or LORICATED CONDUITS

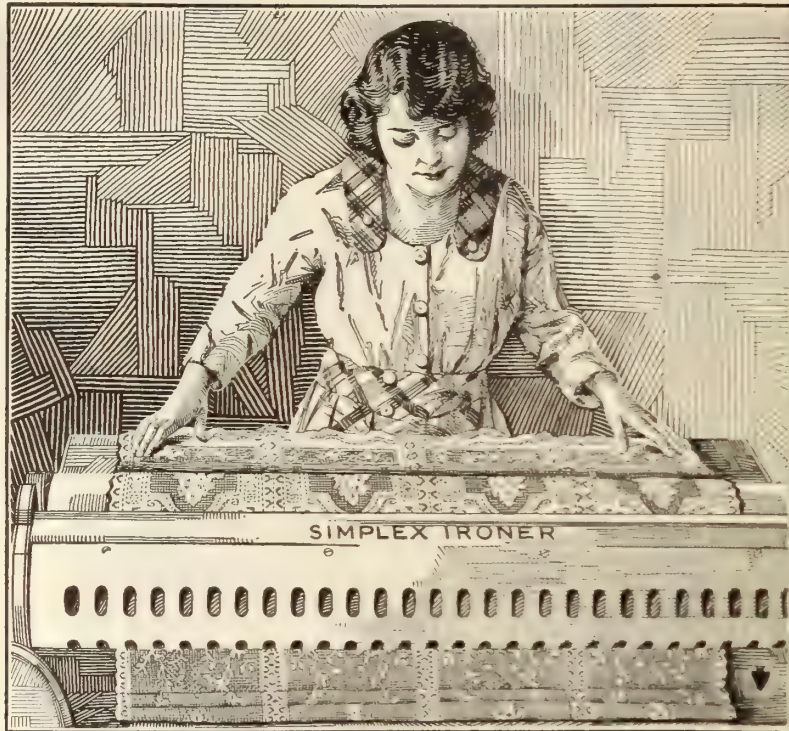
If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg



Saleability

There can be no doubt about the selling possibilities contained in these "Simplex" Ironers.

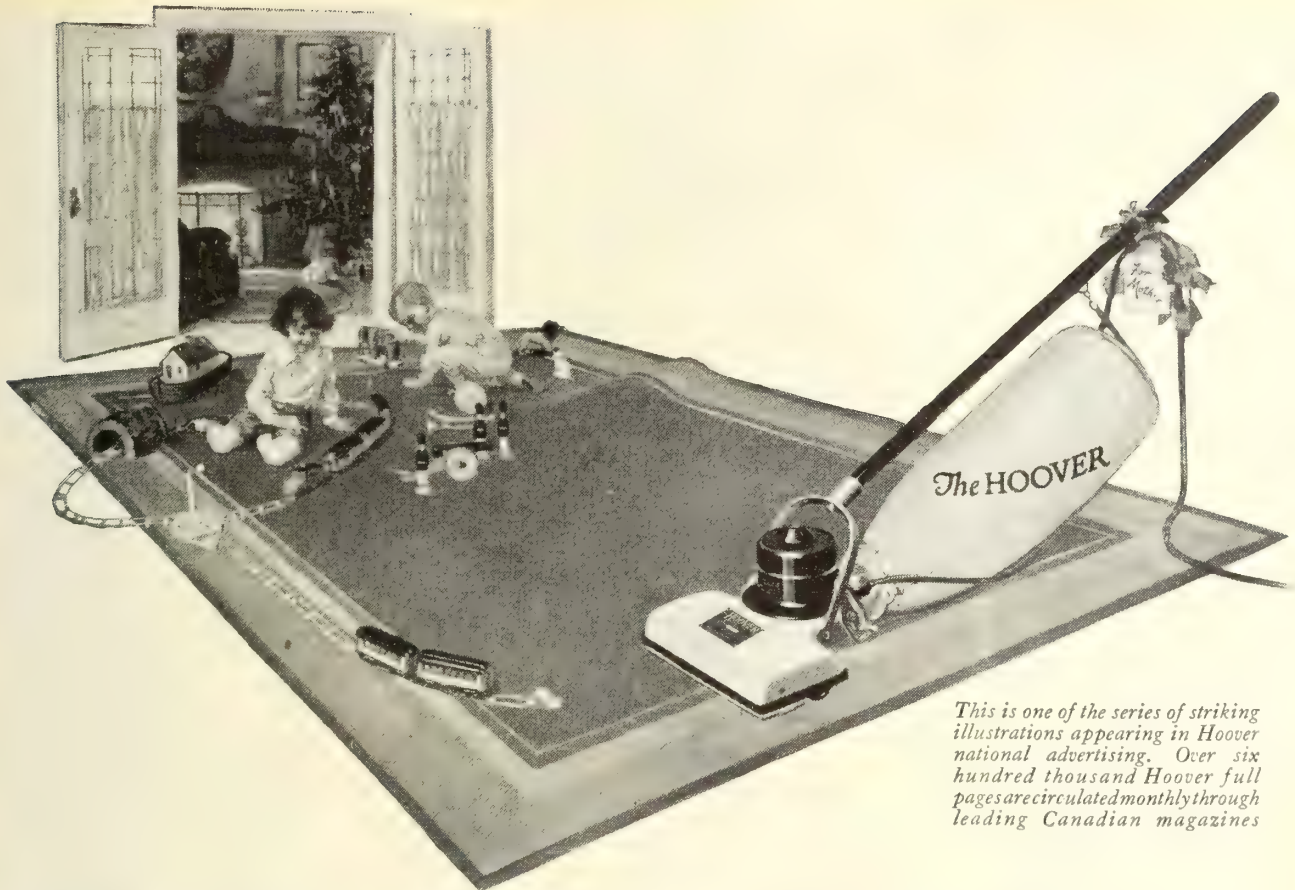
Their splendid construction and high-grade materials insure a long service. And this, together with the fact that they fill a real need, quickly wins over the busy housewife. In addition we render every possible help to the dealer in the way of window cards, folders and newspaper cuts.

It is an opportunity no electrical merchant should overlook. Write and let us send you full particulars. Prices will appeal to dealer and consumer.

Canadian Ironing Machine Co., Limited
Woodstock Ontario

SIMPLEX IRONER

"THE BEST IRONER"



This is one of the series of striking illustrations appearing in Hoover national advertising. Over six hundred thousand Hoover full pages are circulated monthly through leading Canadian magazines

Sell Hoovers for Christmas! Get in Touch with Us at Once

Right now, during the season when many Hoovers will be purchased as Christmas gifts, is a wonderful time to become a Hoover dealer.

The heavy stress laid upon the "Give her a Hoover" suggestion in the advertising appearing prior to Christmas, and the reputation which The Hoover enjoys as being the best electric cleaner, always results in thousands of Hoovers being bought as Yuletide gifts.

You can share in this profitable business by prompt action. Not only that, but thereafter you can enjoy a steady, profitable business throughout the year by selling The Hoover.

On the famous Hoover Resale Plan, our trained selling organization will come into your store

and, with your co-operation, will direct the sales efforts along the proved lines used by other successful dealers.

The work of demonstrating, selling and servicing Hoovers will be assumed, in close harmony with you, by the Hoover organization.

A small investment and little store space will suffice. Your stock of Hoovers will be turned *twelve times a year*—you will make twelve profits a year on The Hoover.

Don't delay decision—every day counts, especially at this season.

Get in immediate touch with us. There is time, if you act now, to take full advantage of the annual Christmas business on Hoovers.

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED
Factory and General Offices: Hamilton, Ontario

The HOOVER

It Beats... as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS



**BAKELITE
DILECTO**

A PERFECT INSULATION

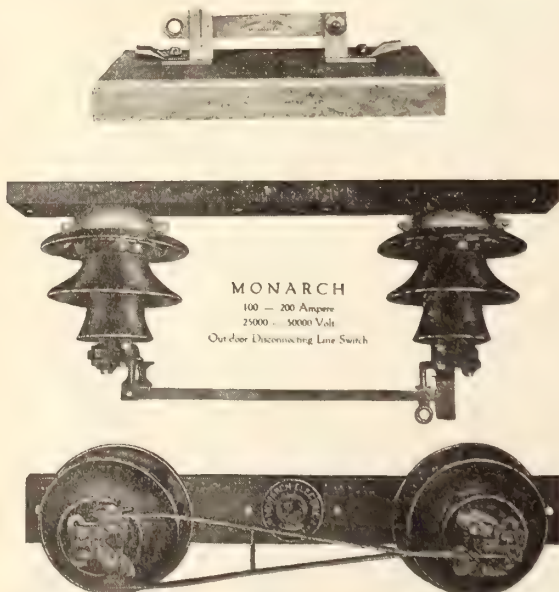
Bakelite-Dilecto satisfactorily replaces rubber, mica, and other materials for insulation purposes or mechanical applications. It is hard and tough, readily machined and neither warps nor swells. It is manufactured in sheets, rods, tubes and special shapes. We also manufacture Vulcanized Fibre and Continental-Bakelite in sheets, rods, tubes and special shapes, and Conite in sheets or rolls from .005" to .020" thick. Write for prices.

Canadian Agents—Henry Engineering Company,
89 Wellington St. W., Toronto

The Continental Fibre Co., Newark, Delaware

Pittsburgh Office	New York Office	Chicago Office
301 Fifth Ave.	233 Broadway	332 S. Michigan Ave.
San Francisco Office, 525 Market St.	Los Angeles Office, 411 S. Main St.	

MONARCH DISCONNECTING SWITCHES



- ❑ Monarch Disconnecting Switches include types for all applications of this class of apparatus.
- ❑ Copper of the highest conductivity and insulation of the most suitable mechanical and electrical design alone are used. Without exception these materials are the product of Canadian factories.
- ❑ Current carrying jaws and moving joints are all made with special care by skilled workmen. Rigid bases and supporting parts insure permanent electrical contact with blades and jaws.
- ❑ Monarch Switches are all Canadian made. Make your purchases encourage home prosperity.

Monarch Electric Company, Ltd.
St. Lambert District of Montreal

BRUSH DATA SHEET
Canadian National Carbon Co. Limited

If you will furnish us with the following data it will enable our engineers to select a brush adapted to your machine

1. Generator, Motor or Static Converter
2. Used for what service
3. Direct or Alternating current
4. Manufacturer
5. Type
6. Serial Number
7. Voltage
8. Rated Capacity in Amperes
9. Maximum Load
10. Duration of maximum load
11. Average load
12. Revolutions per minute
13. Number of poles
14. Has the machine interpoles
15. APPROXIMATE DIAMETER of commutator
16. Is the mica under the commutator slots
17. State number of rings on machine
18. If collector rings, Is material iron-steel, brass, tin, or copper
19. Are brushes carbon, graphite or metal graphite
20. Do brushes run trailing ☐ Leading ☐ or Radial ☐

Information below to be filled out by N. C. Co.
 Peripheral speed of Commutator
 Current Density in brushes
 Grade Guaranteed ☐ For unslopped commutator ☐ For slopped commutator

ANSWER FOLLOWING IF YOU ARE HAVING TROUBLE:
 Do brushes spark, glow, put, burn at face, pick up copper, chatter, squeal or chip?
 Are rings or commutator being worn rapidly?
 Do brushes become longer, well polished, dull or black?
 Are there any other symptoms?
 Do brushes run in pairs?
 Do many conductors have a brush span?
 Do the machine experience voltage or corrosive chemical fumes?
 Do the commutator run hot?
 Do brushes give any trouble per brush?
 Do brushes give any trouble per commutator?
 What grade of brush is used?

How to know the Best Brush for each motor or generator

Columbia Data Sheet Service brings Nation-wide experience to bear on your brush problems. It goes far beyond the experience of any individual or of several individuals.

Columbia Data sheet Service assures the correct Columbia Pyramid Brushes for each machine.

The specialists who secure the facts show on the Data Sheet the condition of each unit. The Board of Engineers carefully analyzes the Data Sheet for each machine. The brushes selected are guaranteed to be satisfactory.

Avail yourself of this service of specialists. It is yours for the asking, whether you have one machine or a thousand.

Columbia Data Sheet Service
 Solves your Brush Problem



CANADIAN NATIONAL CARBON CO., LIMITED

Toronto

Winnipeg

Vancouver

132111

Exide

MADE IN CANADA
BATTERIES



When Science Outshines the Aurora Borealis

Up in the Arctic Regions the modern electric light is again temporarily bringing the comforts of civilization to the Esquimaux. For included in the equipment taken several weeks ago by MacMillan, arctic explorer, in his trip to the polar regions, is an electric lighting outfit equipped with Exide Batteries.

This confidence in the never failing dependability of Exide Batteries recalls their wonderful record made in the Frozen North seven years ago, when MacMillan headed the Crocker Land Expedition.

For unusual service such as this, for use in naval submarines, for lighting whole cities in emergencies—for every purpose where dependable storage battery power is used—there Exides will be found.

Our engineering department will be glad to co-operate with you in solving any storage battery problem that may be occupying your attention.

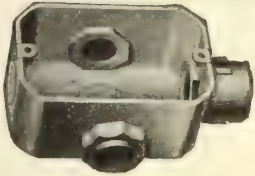
EXIDE BATTERIES OF CANADA, Limited
153 Dufferin Street,
TORONTO

Exide Batteries are made in Canada, in England, and in the United States. Into the Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

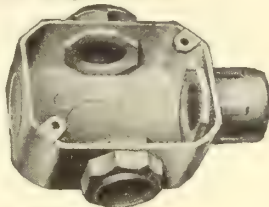
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body



Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

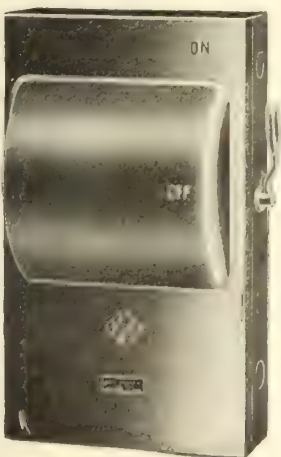
HATHEWAY & KNOTT

Electrical Merchandise

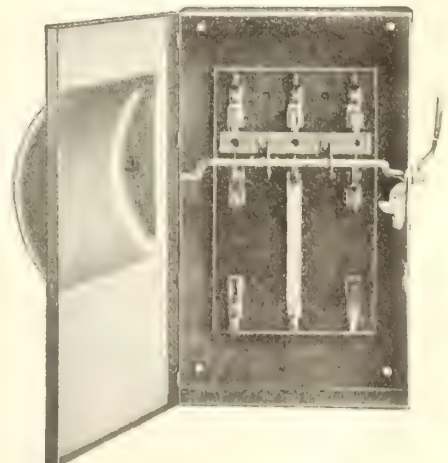
117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

Externally Operated Switches



Langley's Externally Operated Switches are the product of a factory which for 10 years has been manufacturing steel cabinets and cut out boxes for the electric trade.



Langley Electric Manufacturing Co. Limited
WINNIPEG : MANITOBA

Moloney Transformers

RELIABLE AND EFFICIENT



Reliability under the severest conditions has always been one of the most desirable features of MOLONEY Transformers. That they are also efficient and give long service is proved by their ever increasing use from coast to coast. Let us send you full particulars.

MADE IN CANADA

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.

District Offices

Factory

Head Sales Office

Montreal and Halifax

Windsor, Ont.

1221-2 Bank of Hamilton Bldg., Toronto



Safety Panel Boards

No safer or simpler method of operation could possibly be devised. Even a child could operate the Krantz Panel Board in perfect safety.

All live parts are concealed behind a locked door, the key of which is held by the electrician.

An ideal installation for schools, apartment houses, factories, etc.

Write for Catalogue 12-A giving full details.

The Canadian Krantz Electric & Manufacturing Co.

Head
Office

95 King St. East, Toronto

401 New Birks Bldg., Montreal

402 Vancouver Block, Vancouver

703 Confederation Life Bldg., Winnipeg

G. M. Gest, Limited

Contracting Conduit Engineers

Head Office
Power Building
Montreal

Vancouver

Winnipeg

Smith Hydraulic Turbines

**Have Justified Their Installation in many
of America's Biggest and Best
Hydro Electric Developments**

The accompanying view illustrates a SMITH RUNNER, 13 feet diameter, made in one continuous casting by means of dry sand cores.

THREE TURBINE UNITS (of which these runners comprise the rotating element) furnished for installation in the Yadkin Falls, N.C., plant of the Aluminum Co. of America. Each unit develops 10,000 H.P. at 90 R.P.M. under 48 feet head, using water at 92 per cent. efficiency.

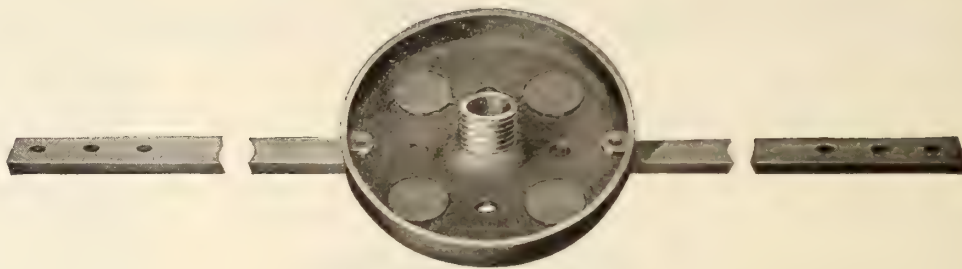
Write Dept. "N" for Bulletin.

S. MORGAN SMITH CO.
YORK, Pa., U.S.A.

H. B. VANEVRY, Representative
405 Power Building, Montreal



The Latest Improved "Banfield" Loom Outlet Box



No. 1045

Stamped Steel Unbreakable Box

3¼ inches diameter 5⁄8 inch deep with lugs. Four clean knockout holes in bottom. Supplied with 3⁄8 inch fixture stud. Flat steel bar entirely removable, punched at either end with 3 holes for fastening to studs by nails or screws.

Box slides along bar until desired position is reached, then by screwing box up against bar it is rigidly held in place. No set screws or lock nuts necessary.

There are four punched holes in the bottom of the box so that it may be fastened direct to the studding, in places where bar cannot be used.

This box will take all standard 3¼ inch METAL or PORCELAIN covers, as well as all metal or porcelain base key, keyless or full sockets, having screw hole centres of 2¾ inch.

Box furnished complete with two screws for covers and two Jiffy Loom Clips.

Standard 3¼inch cover.

Blank Cover No. 1047

Bushed cover for drop cord work No. 1044

Receptacle Cover, adjustable centres No. 1048

Covers regularly furnished in galvanized finish. On special order we will furnish these WHITE ENAMEL to match the plaster line.

W. H. BANFIELD & SONS LIMITED

370-386 Pape Avenue

TORONTO



Showing Shaft No. 510 with Shade 86x26

In Design Materials Price

—nothing quite equals the
“Baetz” line of Portable Elec-
tric Lamps and Silk Shades.

Write for Prices.

Baetz Bros. Specialty Co.
Limited

Kitchener

Ontario

Diamond Fibre

the Universal Raw Material

It's STRENGTH



Bushings
Cleats
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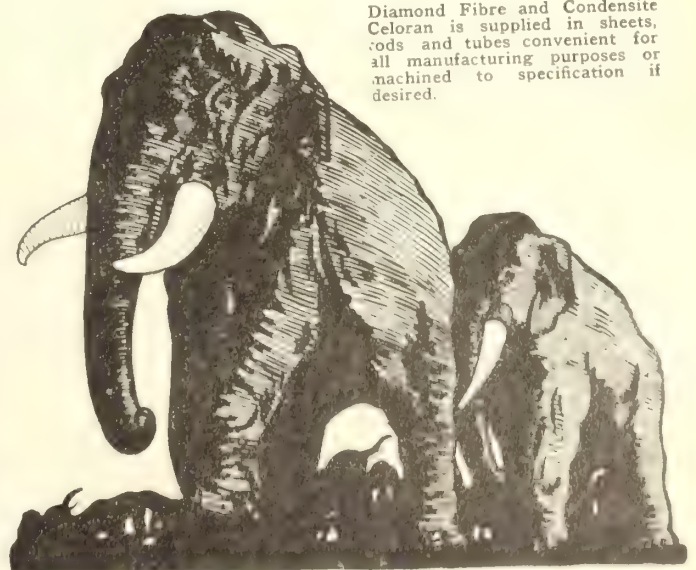
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“TRISTEEL”

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QUALITY ECONOMY

“TRICABLE” Armoured Conductors and
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STATIONS**

SUB STATIONS

**EXTENDED
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**INCREASED
GENERATING
CAPACITY**

**INCREASED
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**ELECTRICAL DEVELOPMENT
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Real achievements in the design of electrical apparatus are being worked out here in Canada, right here in St. Catharines, you will be glad to know—and these are playing no small part in advertising Canada's industrial possibilities to the world.



Canadian Crocker-Wheeler self-cooled transformer, 1200 K.V.A.,
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Manufacturers and Electrical Engineers

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When you want to find out if a tool is satisfactory, ask the man who uses it. He knows if it's properly balanced—heavy enough to do the work, and still not so heavy it will tire the workman. He knows how long it will withstand hard service.

OSHKOSH

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are the choice of nine out of ten workmen. That's why more Oshkosh Tools are sold than of all other makes combined.

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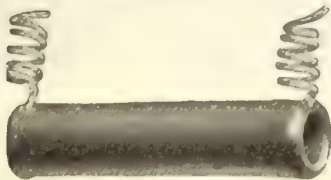
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- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
 - 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
 - 1 10 hp. C.W. 750 rev., starter, rails, pulley.
 - 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
- 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
 - 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 - 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 - 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
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 - 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 - 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 - 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
 - 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 - 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE
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 - 4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Menominee 110 volt, 25 cycle, 1500 rev.

**Toronto and Hamilton Electric
Co., Limited**

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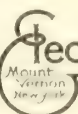


32,000 Ohms on Tube 4" long—5/8" Diameter

The Vitrohm unit pictured here, was originally made to fill a customer's unusual requirements—32,000 ohms in a tube only 4 inches long and 5/8 inch in diameter. We did it by winding extremely fine wire non-inductively in two layers, getting twice the resistance previously thought possible in a tube of that length. Of course, it couldn't have been done without Ward Leonard Vitrohm (Vitreous Enamel) to permanently protect the wire against oxidation.

Tell us the resistance problem you think cannot be solved.

Ward Leonard Electric Company



2016 A



SAFETY FROST

Non-injurious to the skin, non-inflammable and absolutely permanent.

Easy to apply—Simply dip into can and allow excess to drip back for two minutes, and wash off with water.

Is not affected by weather or heat of lamp. It is on to stay.

ARTS ELECTRICAL CO.

Makers
TROY, N. Y.

Carried in Stock by

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ELECTRIC FIXTURES.

*Artistic New Designs.
Imported Glassware in
Combination Fixtures.*



COMPLETE LINE OF

PORTABLE LAMPS, FLOOR LAMPS,
CANDLE AND SHOWER FIXTURES,
COMMERCIAL UNITS, ELECTRICAL
GLASSWARE AND SUNDRIES.



ELECTRIC TOY TRAINS



For the Christmas trade, Electric Toy Trains are in large demand.

We carry a complete range of the best makes.

Nerlich & Co.

146-148 FRONT ST. W., TORONTO.



THE performance of R & M Motors is a source of constant satisfaction to the user, distributor, contractor, and public utility. To the user it means efficient power service and upkeep economy; to the distributor, contractor and public utility it means pleased customers, increasing good will and business permanence.

R & M Motors are made for all services in sizes ranging from 1/40 to 75 horsepower. And the same high quality standard which has made the name "Robbins & Myers" synonymous with reliable power service is maintained throughout the entire line from the smallest to the largest size.

**The Robbins & Myers Company of Canada
Limited, Brantford, Ontario**

Robbins & Myers Motors

"Warm Up" to Your Customers

A seasonable line of conversation with your customers nowadays goes something like this:

"Nice day," says you.

"Yes; but Gee! It's getting chilly these mornings," says he, (or something like that). "We haven't got our furnace going yet. By the time I've shaved I'm blue right through."

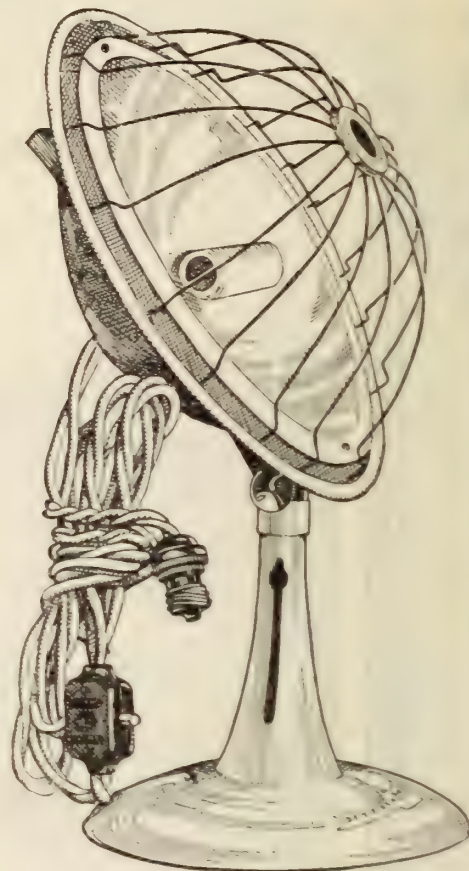
"Why don't you get a Majestic Heater?" says you.

There's only one answer to that question.

The Majestic Heater is the medium-priced heater. It is the popular electric heater.

The Majestic is the efficient heater—it shoots more warmth to the spot where it is needed.

And the Majestic is guaranteed for one year. Absolutely. Push it forward. There's business in it.



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Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31 Toronto, November 1, 1921 No. 21

Municipal Ownership and Business Administration

Sir Joseph Flavelle, chairman of the Board of Directors of the Grand Trunk Railway System, and Mayor T. L. Church, of Toronto, hold diametrically opposite views regarding municipal ownership of our public utilities and the purposes to which it should be put. Sir Joseph says, in a recent letter addressed to the Right Honourable Arthur Meighen, Prime Minister of Canada, that "it should be remembered that ownership by the public establishes no exemption from conditions inseparable from successful business administration. No business can survive if it is the constant target of unfavorable comment and if the management is subject to sustained critical and unfriendly examination."

The Mayor of Toronto thinks otherwise. In his mind there is no connection between municipal ownership and business-like administration. Political exigencies stand first in His Worship's mind. The public must be pleased so that they will vote for the man who pleases them; then they will not care whether their business is properly managed or not. With indisputable proof that the cost of operation of the Toronto transportation system demands a seven-cent fare, or close to it, Mayor Church advocates a five-cent fare—because he knows the rank and file of the citizens would rather pay five cents than seven cents. It is immaterial to him—a mere detail—that this would inevitably involve a further strain on Toronto's tax-payers. It is a mere detail in his calculations that the individual tax-payer in Toronto

pays more than twice as much as the individual tax-payer in Montreal—a mere detail that under his administration the tax rate in the city has increased from 19¼ mills in 1914 to 33 mills 1921—in spite of large increases in assessments.

Nor does Mayor Church agree, apparently, with Sir Joseph Flavelle that a business cannot survive if it is the constant target of unfavorable comment and if the management is subject to sustained critical and unfriendly examination. In one breath Mayor Church takes the credit for the municipalization of Toronto's street railway system and, in the next, subjects it to "unfavorable comment" and makes it the "subject of sustained critical and unfriendly examination." He claims to be responsible for the appointment of the commission, gives his hearty approval to their selection of officers, and then proceeds to put every possible obstacle in the way of their performing the functions for which they were elected.

* * *

Such is municipal ownership in the city of Toronto and such, in general, is the weakness standing behind the municipalization of our public utilities. In effect, there should be no difference in the two systems except differences of minor details, only remotely associated with the management; these differences are that the money is supplied by the citizens at large, rather than by a small group, and that the management is selected by the citizens at large, rather than by a small group. The underlying principles of operation remain absolutely the same and no more important statement concerning municipal ownership was ever made than that of Sir Joseph Flavelle quoted above "that ownership by the public establishes no exemption from conditions inseparable from successful business administration." In other words, the administration of a municipal utility must be businesslike. It must be developed along lines as aggressive, as sound and as free from outside interference as must the administration of any private industry.

It is doubtful if Mayor Church, and men of his type, will ever realize these facts. They are so thoroughly saturated with the idea that politics is the supreme end, and everything else in life merely a means to that end, that their influence is a factor that will always have to be contended with. There is grave danger that men of this type will eventually discredit municipal ownership entirely in the public mind. Unless the idea prevails that public ownership also implies successful business administration, municipal ownership is doomed.

Great British Empire Commonwealth

That Great Britain is rapidly recapturing foreign markets temporarily lost during the war years owing to national and military needs, was the statement made by L. B. Beale, His Majesty's Trade Commissioner, of Winnipeg, in an address to the Manitoba Electrical Association on September 29th.

Mr. Beale dealt with Great Britain and Empire Trade, pointing out that the British Empire represented one quarter of the globe, with a population also one quarter that of the whole world. He first gave a brief resume of the enormous volume of trade which the United Kingdom did before the war, and traced the effect of the war on this trade. He also gave some very encouraging figures in regard to the rapid manner in which the Empire's trade has been developed since the war, showing that the British manufacturer has regained his premier position in the world's commerce. Shipping coal, raw material, cheap freight and the high quality of British workmanship, were the factors which had secured the world's markets for the United Kingdom in 1919, and the United Kingdom had one third of the total trade of the world.

With the clearing away of restrictive conditions imposed

by the war, the British manufacturer is taking full advantage of the opportunities presented, generally adopting more efficient productive methods, and showing commendable enterprise.

Mr. Beale pointed out that the United Kingdom owned 40% of the world's shipping tonnage, and with prospects of lower freights, he predicted a constant increase in the volume of Empire trade. He mentioned that the greatest trade fair in the world's history was to be held in England in 1922, and stated that he was anxious to co-operate with any Canadian manufacturers interested.

Looking to the future, Mr. Beale predicted that out of war and hard times, there would develop a great British Empire Commonwealth, dependent on its several parts in trade and commerce. The United Kingdom, he said, was the best buyer of Dominion products, while the Dominion was the best customer of the United Kingdom.

Opportunity and Privilege of Public Service

That modern business problems had been created by the so-called doctrine of competition, was the assertion of Dean Stephen I. Miller of the Northwest Electric Service League, when he addressed the British Columbia Electrical Co-operative Association on the occasion of that organization's first annual banquet at the Hotel Vancouver. Dean Miller, the speaker of the evening, gave a most inspiring address on the value of co-operation as opposed to competition. Competition, he said, had destroyed loyalty and ideals of community service, but such co-operative movements as that typified by the B. C. Electrical Co-Operative Association would develop those ideals. Throughout his address he impressed the value of public service. He urged his hearers to the greatest effort to attain the ideals for which they were organized. Every effort of members of the association should be devoted to securing some tangible benefits for their fellow-men and no industry offered greater opportunity in this regard than that in which they were engaged.

Dwelling on development of electricity, Dean Miller predicted that at the present rate of consumption the oil and petroleum supplies of the United States would become exhausted in ten years, and the demand for hydro-electric power would require an expenditure of more than a billion of dollars in the states of California, Oregon and Washington alone, in the ten year period. It would not be an easy task to secure that vast amount of capital, and public confidence, which is developed through publicity, was vitally necessary. Electrical associations and leagues had come into being for the promotion of better business methods in the industry. True ideals of public service could not be reached by men with no knowledge of merchandising costs, with poor methods of salesmanship and lack of appreciation of window displays as well as no understanding of the benefits of proper advertising.

Dean Miller reviewed the organization of the Northwest Electrical Service League, which covered the states of Washington and Oregon. He defined many problems similar to those of the B. C. association, and outlined the way in which the League had attacked these problems. He spoke most emphatically in favor of electric expositions and such displays as electrical homes, completely equipped with labor-saving appliances. These demonstrations were essential, he said, to the extension of the market for electrical appliances, and he gave figures of attendance for various exhibitions, which showed the keen interest of the people in electrical development. In addition to being secretary-manager of the Northwest League, Dean Miller gains his title through being head of the College of Commerce in the University of Washington at Seattle.

The first annual report of the B. C. Electrical Co-Operative Association, submitted at the banquet meeting, detailed the organization steps taken a year ago, when each branch of the industry named representatives on an advisory council, which continues to function. Since the appointment of Mr. Rey E. Chatfield as secretary-manager, the advisory council has been holding weekly meetings, instead of monthly as before. All meetings of the council are open and may be attended by every member of the industry. For the financing of the association a budget for the first year was arranged, apportioning the cost as follows:

Central Stations	50 per cent
Manufacturers	25 per cent
Jobbers	10 per cent
Contractors and Dealers	15 per cent

These proportions, the annual report states, will not hold good for the ensuing year, owing to changes in the industry. The 1921-1922 budget has been fixed at \$6,000, to be contributed in the following proportions:

Central Stations	50 per cent
Manufacturers	17.5 per cent
Jobbers and General Subscriptions ..	17.5 per cent
Contractors and Dealers	25 per cent

Commission agents handling electrical appliances and electrical goods are asked to contribute \$25. per annum to the association.

Reviewing the work of the past year the annual report gives details of the successful electrical show held in the Drill Hall, Vancouver, in November of last year. The educative campaign among the contractor-dealers, is also reported on, showing the efforts to induce all individuals, whether members or not, to avail themselves of the meetings of the Contractors-Dealers Association, which were "open" for that purpose. In connection with that phase of the work the report dwells on the policy of the association announced at its inauguration: "That the practice of proper accounting and other good business methods and of good business ethics will result in companies and individuals being able to ask for their goods and service a price that will include a fair profit."

Plans for the coming year are outlined in the report, the service department aiming to help dealers and contractors to better merchandising of their goods, architects to plan better electrical installations, and also to promote the industry in public. A campaign for better street lighting, industrial and store lighting is contemplated. An industrial lighting exhibit is to be opened in Vancouver at an early date. In the spring months the proposed Electrical Home exhibit is planned, to educate the public on the advantages of increased use of electric appliances and modern methods of illumination, and the necessity of stipulating for greater convenience in outlets in specifications for homebuilding. Extension of the Co-Operative Association's work to other parts of the province is also included in the programme for the coming year.

HYDRO-ELECTRICAL DEVELOPMENT

One of the speakers at the annual banquet was Mr. Geo. Kidd, president of the association and general manager of the B. C. Electric Railway Company. He might claim much credit for the success of the association, as its inception was largely due to his efforts. Mr. Kidd gave an inspiring address on the work accomplished in the association's first year. Referring to the central station, in which he was actively interested, Mr. Kidd announced that another unit of the Stave Lake Power plant would be in operation soon. Most of the equipment for it was now in place and on the arrival of some necessary equipment from Switzerland the unit would be complete. This would bring the Stave Lake

plant up to 50,000 h.p. capacity, while the Lake Buntzen plant had 70,000 h.p. capacity. Though 50,000 h.p. was the present limit at Stave Lake, by simply raising the level of the storage dam a very much greater production would be available. This would require an expenditure of \$1,000,000 on the dam. The company also had another power scheme, which would add 150,000 h.p. to its output. As far as present demands, were concerned the present installation of the company could meet it.

Other speakers were Mr. H. Pim, hon. treasurer of the association, Mr. W. W. Fraser, president of the Electrical Contractors and Dealers Association; Mr. E. E. Walker, chairman of the advisory council and Mr. Rey E. Chatfield, secretary. Telegrams of congratulation to the association on its first anniversary were read from Dr. Carr, editor of Electrical News, Mr. Robert Sibley, editor of the Journal of Electricity and Western Industry of California and Mr. M. K. Pike, veteran sales manager of the Northern Electric Company, Montreal.

Kiwanians and Manitoba Electrical Ass'n. Hold Dinner Dance

On Tuesday, October 11, the Fort Garry Hotel, Winnipeg, was the scene of a brilliant dinner and dance, the occasion being Kiwanis ladies night. The Kiwanians had as their guests members of the Manitoba Electrical Association and ladies. Over four hundred were in attendance at the dinner. The Manitoba Electrical Association had the honor of putting on the program, which was one to be proud of, some of the best musical talent in the city being present.

The tables were daintily decorated. At one end of the banquet hall upon the stage was a living room, electrically equipped by members of the Manitoba Electrical Association. Mr. M. E. Deering gave a very interesting address and explained to those present the necessity of having a house in the course of construction properly wired, to allow for any appliances that the owner of the house might wish to use from time to time. He went on to explain that there was no reason why the housewife should not have the latest electrical appliances, on account of the exceptionally low rates in Winnipeg, for electricity.

Mr. Borrowman, president of the Kiwanis Club, thanked Mr. Deering for the splendid talk he had given the Kiwanians and their ladies, and was sure that everyone present had learned considerable about electricity and its uses.

Mr. W. C. Taylor, one of the Winnipeg Electric Railway Co.'s engineers, also a member of the Manitoba Electrical Association, gave an address entitled "The Efficiency Engineer in Municipal Affairs", which was of a partly humorous nature, and created considerable mirth.

Six splendid prizes were donated by the Northern Electric Co.; Wheaton Electric Co.; Winnipeg Hydro; Cochrane Stephenson Co.; Great West Electric Co. and the Canadian General Electric Co., which were drawn for at the "Prize Drawing."

After the dinner the guests adjourned to the Ball Room, where a very enjoyable dance concluded a pleasant evening's entertainment.

Toronto Hydro Annual Report

The Toronto Hydro-electric System have issued their 10th annual report, which covers the year ended December 31, 1920. The gross income for that year was \$3,150,847., and the net surplus, after deducting the costs of current, operations and management, repairs and maintenance, interest, depreciation, exchange, taxes, sinking fund and debenture retirements, was \$122,728.

An interesting calculation is made in the report to the effect that had the enterprise been conducted as a commercial corporation, with perpetual share capital, the net earnings would have been shown as \$735,664., this amount representing the interest payment, sinking fund appropriation, the debenture retirements and the net surplus. This, it is calculated, would be the equivalent of a dividend at the rate of approximately 8.7 per cent.

The net funded debt of the system is \$8,470,563., against which are net reserves, in the nature of surplus, to the amount of \$4,003,098.

In spite of the business depression the gross income of the System increased 25.8% over 1919, and the commercial income by 31.2%. The actual cost of power to the provincial Commission was \$17.44 per h.p. To this there must, of course, be added the cost of distribution. The report states that the expenditure of the city of Toronto on the local distributing plant is \$196.70 per average horsepower purchased.

It is interesting to note that this is actually higher than the average cost to other municipalities in the Niagara zone for, while the cost of the power itself is less in Toronto, the cost of distribution is, approximately, twice as great.

It is further interesting to note that the average horsepower taken by the System for the first five months of 1921 has been still greater than the average horsepower taken during the first five months of 1920.

A brief report, appended by the general manager, H. H. Couzens, gives actual figures regarding the growth in consumption. He states that in spite of adverse conditions and the fact that new services were only connected in cases where hardship would have resulted through refusal to supply, the number of consumers increased by 7,500; the connected load increased by 18,500 h.p. and the total energy consumption increased by 34,000,000 kw. hrs. over the corresponding figures of 1919.

The Big Lesson Wrigley Learned in Dull Times

"The result of my investigation was that I signed up in the midst of the depression of 1907 for \$1,500,000 worth of advertising—our first national contract and a very large one indeed for us at that time. It was, as you see, another restraint in the face of an opportunity for immediate profit.

"But for once the policy did not involve the sacrifice of immediate profits even. We really had expected it would. We were after the vivid impression we thought we could make on dealers and consumers at a time when so few people were trying to sell them, and we were willing to pay something for that. We were willing to wait for our returns. But we did not have to wait. They came generously enough even the first month to meet what had seemed an enormous first payment on the advertising, due at the end of the month, and the payments every month thereafter were entirely met out of the increase in our profits, with a continually widening margin to spare."—Wm. Wrigley, Jr., in "System."

Illuminating Engineering Society in Annual Convention

Review of Year's Progress—Fewer and simpler types of Fixtures —Eye Strain Experiments, Sky Brightness, Lamp Temperatures

By G. G. COUSINS

Chairman, Toronto Chapter, Illuminating Engineering Society

The convention of the I. E. S. that has just been held in Rochester can be classed without exaggeration, one of the most successful in the history of the Society. Twenty seven papers were presented covering many branches of illuminating engineering. A notable feature of these was the very practical nature of the material presented. Every paper was full of valuable information and any attempt to give even the briefest account of the convention must be reduced to the mentioning of a few of the "highlights".

The Year's Progress

A review of the year's progress shows that improvements are continually being made in the construction of search-lights. Considerable progress is also being made in the production and projection of motion pictures and the lighting of the theatres.

The most advances in exterior lighting have been the development of fixtures to produce extended distribution of light along the streets and the use of higher power lamps in sign lighting.

In interior lighting the standardization of fixture accessories and parts will be appreciated by the householder as well as the dealer and manufacturer. Greater attention is being paid to keeping glassware clean and the use of totally enclosing units is increasing.

In the manufacture of incandescent lamps it is expected that the year 1921 will see the practical elimination of carbon lamps, as far as lamps manufactured in America are concerned. Gas filled lamps amount to 20% of all the lamps disposed of during the past year. In Germany the number of carbon lamps has increased and that of metal filament lamps has decreased.

A new lamp for series burning is now available rated at 2500 c.p. 20 amps.

The general adoption of the lumen rating for all types of incandescent lamps has been practically accomplished.

It has been found that dust on lamps begins to smoke at 140 degrees C. to 166 degrees C., which is about the bulb temperature of the lower wattage gas-filled lamps and is 56 to 83 degrees higher than the vacuum lamps. The lowest ignition temperature of dust is about 260 degrees C.

Neon vapor lamps—as low as 5 watts for ordinary circuits—have been produced in England. These are suggested as signal lamps for switch boards, motors, etc.

The beam candle power of head lamps increases approximately as the square of the reflector diameter.

An improvement in motion picture projection consists of a series of rotating mirrors replacing the ordinary shutter. The film is fed continuously and there are no dark periods between successive picture images.

A proposal has been made to adopt a standard form for showing all the data needed by illuminating engineers to get an adequate idea of an installation. This would replace the many forms of different styles that are now in common use.

The tendency in street lighting is toward single lamps in prismatic glassware and higher mounting heights. Con-

crete posts are competing with cast iron for public favor.

Interior Lighting

Fixture manufacturers have been making big reductions in the number of patterns and designs. It is thought that the demands of the fixture buying public can be met with fewer and simpler types without sacrificing esthetic requirements. A standardization of mechanical details has also been under way, involving complete sets of gauges for details of glassware, heels, globe proportions, lamp positions, etc.

The use of dust proof enclosing glassware is increasing.

A shadow shield of white translucent glass has been designed to eliminate the shadows of fixture chains and the edges of bowls.

Nomenclature and Standards

A meeting was held in Paris, in July, of the International Commission on Illumination and special committees were appointed to study the following subjects:—Heterochromatic Photometry, Photometric Definitions and Symbols, Lighting in Factories and Schools, Automobile Headlighting.

Three of the fundamental ideas of illumination were defined as follows:—

Luminous flux is the rate of flow of radiant energy evaluated with reference to visual sensation. Although luminous flux may be strictly defined as above, it may be regarded for practical photometric purposes as an entity, since the rate of flow is for such purposes invariable.

The unit of luminous flux is the lumen. It is equal to the flux emitted in a unit solid angle, by a uniform point source of one international candle.

Illumination of any point of a surface is the luminous flux density at that point, or, when the illumination is uniform, the flux per unit area of intercepting area.

The practical unit of illumination is the Lux. It is equal to one lumen per square meter or it is the illumination at any surface of a sphere on one meter radius due to a uniform point source of one international candle placed at its centre.

As a consequence of certain recognized usages, the illumination can be expressed by means of the following units:

Using the centimeter as the unit of length the unit of illumination is one lumen per square centimeter, and is called the Phot. Using the foot as the unit of length, the unit of illumination is one lumen per square foot and is called the Foot-candle.

The Luminous Intensity (power) or Candle Power of a point in any direction is the flux per unit solid angle emitted by the source in that direction. (The flux from any source of dimensions which are negligibly small by comparison with the distance at which it is observed, may be treated as a point.)

The unit of luminous power (intensity) is the international candle such as has resulted from international agreement between the national standardization laboratories of France, Great Britain and the U. S. A. in 1909.

It is proposed to use the term "luminaire" to replace the common misnomer "fixture" which has recently been applied to portable and removable units.

Lighting Legislation

The code of lighting for factories, mills and other workplaces as issued by I. E. S. is becoming generally adopted throughout the United States.

There has been a demand for the requirements of the code to be more specific in order that inspectors may have less difficulty in applying the rules in practice.

In the revised code the text has been re-arranged into three parts:—Part 1 containing the rules; Part 2 containing suggestions and general information with notes relating to each rule; Part 3 containing a statement of the advantages of good lighting.

The code is useful as a guide for factory owners and operators in their efforts to improve lighting conditions in their factories.

The rules in general are more definite and less drastic than formerly. They apply to both daylight and artificial light.

The various classes of work are classified and the different classes included in each range of foot-candles are grouped. This is a departure from the usual method of listing the intensities for the various classes of work.

Five principal causes of glare are given:—

1. Brightness of Source—The light source may be too bright: that is, it may give off too high a candle power per square inch of area.

2. Total Volume of Light—The light source may be too powerful for comfort: that is it may give off too great a total candle power in the direction of the eye.

3. Location in the Field of View—A given light source may be located at too short a distance from the eye, or it may lie too near the centre of the field of vision for comfort, that is, within too small an angle from the ordinary line of sight.

4. Contrast with Background—The contrast may be too great between the light source and its darker surroundings.

5. Time of Exposure—The time of exposure may be too great, that is, the eye may be subjected to the strain, caused by the light source of given strength within the field of vision for too long a time.

A very complete classification of light sources and complete lighting units as regards glare is included.

Some units are satisfactory in certain locations and glaring in others. The data are arranged in tables so that the classification of each type of light source can be seen at a glance.

Taken as a whole the code is a very complete and valuable handbook on industrial lighting.

The stated requirements as to intensities of illumination are the lowest values that can be considered as satisfactory and the factory operators are usually willing to provide good lighting in excess of the minimum requirements.

The Effects of Illumination on the Eye

Research to determine the effect of ultra violet radiation on the eye has resulted in the conclusion that there is not sufficient radiation in the ultra violet from any of our common light sources to be harmful even when such sources are accidentally used without globes.

Glass Blowers' cataract is caused by overheating of the eye as a whole with its consequent disturbed nutrition of the lens.

Experiments were made with a quartz mercury arc lamp which gave 65 degrees of its light in the ultra violet.

Test results indicate that the human eye could be ex-

posed, at close range, to the magnetite arc for at least two hours without the retina being damaged by ultra violet light. The common effects caused by glare would, however, remain.

The well known work by Drs. Ferree and Rand on the effect of various phases of illumination on the functioning of the eye has been extended to cover the effects caused by the color or composition of the light.

The wave length (color) and purity of light effect the resolving power of the refracting media or the power to form clear images. Intensity, hue, saturation and brightness effect the power to discriminate details in these images or, in other words, the resolving power of the retina. There is a time lag in the retina's response to colored light and this varies with the wave-length and intensity of the light.

Colored lights that give a relatively high visual acuity may not give an equally relatively high power to sustain acuity; yellow stands first in the list for the three most important aspects of clear seeing, acuity, speed of discrimination and power to sustain acuity. Yellow-green and green stand high in these three aspects but not so high in the tests for fatigue. The indications are that the ruddy yellow and well into the orange, rank comparatively high all around while deep reds, blue-greens and blues are not meant to serve as backgrounds upon which achromatic details must be discriminated with precision, ease and speed for long periods of time. Tests with a daylight glass for a type C lamp showed that the acuity is higher for the daylight color than for the unmodified light from the lamp, both being slightly higher than for the yellow light of the spectrum.

The speed of discrimination was also higher for the daylight glass than for spectrum yellow.

The power to sustain visual acuity was much greater for the daylight glass and the unfiltered type C lamp than for the spectrum yellow.

The power to sustain acuity is the most positive test to determine the ability of the eye to function properly and it is in this test that daylight color shows the greatest superiority.

Rather closely related to the previous subject was a paper on Eye Fatigue in Industry.

Tests have shown that diffused daylight is the best illumination and that industrial plants supplied with good daylight illumination will experience little trouble with eye fatigue among the workers.

Dark eyes are usually considered stronger than light ones due principally to the darker ones being better protected from excessive light. Light eyes prevail among northern nations and darker ones among races who live in the glare of the tropical sun.

Monotony in color should be avoided; attractive soft color schemes in work rooms will prove refreshing to the eyes.

Neither red walls nor pure white are inviting and both tend to produce fatigue. Neutral gray is a restful color to the eyes.

For extremely fine work magnifiers should be made use of. These call into use more nerves and consequently lessen the fatigue.

Sky Brightness and Daylight Illumination

The measurement of sky brightness has been found to be of use in various ways in different branches of illumination.

The measurements were made with a Sharpe-Millar Photometer, most of them from an observation station near Washington, D. C.

Dense white clouds are from 5 to 10 times as bright

as the adjacent blue sky. With the sun 30 degrees above the horizon its surface brightness is 1,000,000 times the brightness of the clear sky at the zenith.

In the District of Columbia the electrical distribution system furnishes favorable conditions for establishing the relation between sky brightness and lighting load. A sudden increase in current consumption occurs when the daylight illumination intensity on a horizontal plane falls below 1500 foot candles, the lower the intensity the higher the current consumption. Fluctuations in intensity above 1800 ft. c. have only a negligible effect.

The time of the day when the intensity normally falls to 1500 ft. c. has been computed.

Color Temperature and Brightness of Various Illuminants

Under the above heading is described a method of evaluating the quality of light by means of its temperature-color relation. The earlier methods of evaluating the color of a light source by means of a colorimeter were to state its percentages of red, green and blue light with reference to some standard white light.

The method here described is based on the fortunate circumstance that nearly all of our modern illuminants radiate energy very nearly like a black body and the color of a light source may be stated as the temperature of a black body which is raised to such a temperature that its color matches that of the light source under investigation. The color of light emitted by a black body is a function of its temperature. As the temperature is raised the light passes from a reddish color to nearly white until at a temperature of approximately 5600 degrees K. it matches sunlight color.

The measurements of color temperature can be made with an ordinary photometer, if a standard electric lamp with a known color temperature scale is available. A test lamp is placed on one end and a comparison lamp at the other end of the photometer track. The voltage of the comparison lamp is adjusted until its color matches that of the test lamp. The test lamp is then removed and the standard is placed in the same position and its voltage adjusted until its color is the same as that of the comparison lamp which is maintained at the voltage determined in the first part of the experiment. From the calibration curve of the standard lamp the color-temperature corresponding to the observed voltage may be read, which is the color temperature of the observed lamp.

The calibration of carbon and tungsten lamps has already been done and the results published in convenient form.

The color temperature of the sperm candle is 1930 degrees K., of the 4-watt-per-candle carbon lamp 2080 degrees K., of the 1.25 w. P. C. vacuum tungsten lamp 2400 degrees K., of the 500 watt 0.72 watt-per-spherical candle 2880 degrees K. and that of the sun observed at the earth's surface is 5600 degrees K. These figures show what a large difference exists between the most efficient tungsten lamp and the sun as compared to the smaller differences between the various common illuminants of the present and the near past.

The black body is in reality a small electric furnace with an opening in one side through which its color is measured.

The above method does not apply directly to any light source whose color cannot be matched in color by a black body at some temperature.

Incandescent Lamp Temperatures as Related to Modern Lighting Practise

This paper contains valuable information on the actual temperatures of various parts of lamps under ordinary operating conditions and also gives some information on the much discussed problem of ventilation.

The bulbs of ordinary lamps soften at about 600 degrees F. Motion picture gas filled lamps are made with bulbs of much higher softening temperature.

Lamp bases may become loose due to temperatures above 400 degrees F. On well designed lamps the temperature at this part is well below 400 degrees F.

The chief cause of anxiety is the deterioration of the wiring and sockets. The Underwriter's Code requires slow burning wire in a fixture where the temperature of the wire exceeds 120 degrees F. This temperature is sometimes exceeded in units of comparatively low wattage. Tests conducted on brass shell sockets with impregnated paper lining equipped with various types of shades and reflectors and the household sizes of gas filled lamps, indicate that it is practically impossible to raise the temperatures high enough to injure the sockets.

The maximum temperature of gas filled lamps in P. S. bulbs is just below the neck where the temperature of the 100 watt size is about 220 degrees F. The temperatures at the base and tip respectively are 100 and 160 degrees F. The maximum temperature of the 50 watt vacuum lamp is 153 degrees F. The maximum temperatures of type C lamps are 262 degrees F. for 50 watt white, to 371 degrees for the 1000 watt. The C-2 lamps range from 329 for the 75 watt size to 424 degrees for the 500 watt. C-3 lamps of 1000 and 1500 watt sizes have maximum temperatures of 363 and 541 degrees F. respectively. The temperature at the base of the 50 watt type B is 113 degrees F. and 318 degrees F. for 1000 watt C-3. The 1000 watt-C has a base temperature of 165 degrees F. The above figures are for bare lamps.

Maximum temperatures of lamps in totally or nearly enclosing glassware range (for the 200 watt size) from 324 to 569 degrees F., for different types of glassware, the corresponding base temperatures are from 226 to 348 degrees F. The temperatures of the wires in the conduits, 1" from the binding screws, varies from 140 to 240 degrees.

The tests showed that as a rule the wire and socket temperatures of well-designed non-ventilated units were increased when ventilation by the regular methods was provided. About the only types of units in which ventilation lowers the wire temperature are those with holders of relatively large diameters and the holes so arranged that the heated air is directed away from the socket and not allowed to flow along its outer surface.

The bulb temperatures of lamps in open reflectors are well within the safe limits. The wire temperatures in open reflectors are little affected by ventilation in the holders. The temperatures are generally lower than in enclosing glassware.

When silk and fabric shades are used the material may become charred and start a fire if it is closely wrapped around the bulbs of the ordinary household sizes of vacuum and gas filled lamps. It is only in extreme cases that trouble will result.

The temperatures of vapor-proof units are very slightly higher than the types previously mentioned.

A lot of valuable data is given on temperatures required to ignite various kinds of dust.

Low Voltage, Self-Starting Neon-Tungsten Arc-Incandescent Lamp

This type of lamp, three of which were demonstrated by Mr. D. M. Moore, is a combination of light produced by corona glow within the bulb and incandescence of a filament burning at a relatively low temperature. The lamps were operated on an a.c. lighting circuit and can be made in any size required from 1 c.p. up. Some experimental lamps have been on test for over 700 hours. A peculiarity of these lamps is the sudden extinguishing of the light when the circuit is opened. This is instantaneous and indicates an application to signalling where speed of flashing is essential.

It has been stated that the present incandescent lamps have about reached their theoretical limit of efficiency and that radical improvements are most likely to come from light derived from luminous gas. This neon lamp is a practical step in this direction. Its present efficiency is not appreciably better than our tungsten lamps.

The Code of Fixture Design and Installation

A committee of the I. E. S. is co-operating with one from the fixture manufacturers and considerable progress is being made in standardizing fixtures and glassware dimensions.

Animal Light and Luminescence

A very interesting lecture was given describing the means of producing light by various forms of animal life. Some specimens were exhibited. Some forms of microscopic marine insects can be taken and dried, and upon being mixed in water again the luminescence is restored. This was demonstrated by mixing the dry substances with water in test tubes. An intense pale blue glow was produced in each case.

Another lecture described the early attempts to produce light by means of fluorescence and phosphorescence. The various compounds and their limitations were described. The light so produced was of too low intensity to be of practical use.

Automobile Headlighting

Three papers on various phases of this subject were presented.

The specifications for tests and road performance proposed by the I. E. S. are being more generally adopted, and improved lighting of the roadways is resulting from their enforcements.

The State of Massachusetts has modified the requirements and is demanding a much broader spread of beam below the horizontal and limiting the use of lamps to the 21 c.p. type C size.

For the purpose of securing data as to the amount and distribution of light required by various drivers for different driving speeds, a car was fitted up with three pairs of head lamps, each pair individually controlled, as to intensity and direction of beam, from the driver's seat. Those participating in the tests were allowed to produce the lighting to suit their individual desires for the different driving speeds and the many road conditions included in the tests. Provision was made for controlling and reading the voltages of the lamps.

For speeds up to 25 miles per hour the intensities above the horizontal were well within the limits of the present specifications but for 40 miles per hour the glare points were exceeded. This proves that for fast driving the most efficient use possible should be made of the available light from the lamp filaments. For the fast speeds very powerful beams were required far in advance of the car and in order to secure sufficient light so near the horizontal the light above the horizontal was considerably above the allowable limits of the present regulations.

Flicker Photometry

The present status of the flicker photometer as a laboratory instrument for the measurement of lights differing in color was discussed. The work and investigations on this subject confirm the theories of those who have advocated its use under specified conditions. It is being used at the present time with more confidence as to the reliability of its results than ever before.

Interlaboratory Measurements of Gas-Filled Lamps

The agreement between measurements of particular lamps at different laboratories gives a good indication of the soundness of photometric practice, especially where lamps differing in color are measured. Nine laboratories participated in the measurement of five groups of gas-filled lamps, ranging in color (whiteness) from 100 watt to the movie type. These lamps furnish very considerable photometric problems and the results of the measurements at the various laboratories were very gratifying, quite satisfactory agreement being obtained in nearly all cases.

Points for Integrating Spheres

Much of the success attending the use of sphere photometers depends upon the quality of the interior surface. The requirements of a satisfactory paint are unusually severe and are as follows:—

1. It should be perfectly matt,
2. It should be tenacious and somewhat elastic.
3. It should be pure white and should not change color with age or temperature.
4. The reflection factors should be high.

Requirements 1 and 3 are the hardest to fulfill. No commercial paint is white.

The most suitable paint found from an investigation for the purpose is made of lacquer and zinc oxide. The lacquer is composed of:—

Denatured Alcohol	100 parts by weight
Camphor	15 parts by weight
Colorless Celluloid	10 parts by weight

The paint is prepared by mixing:—

Lacquer	4 parts by weight
Alcohol	1 part by weight
Zinc Oxide	4 parts by weight

Mix these thoroughly, then add slowly 2 parts of alcohol and one or two parts of water—white turpentine.

Engineering Factors in Electric Sign Design

Many factors enter into the production of a sign to secure the maximum amount of legibility from a distance. The height and width of letters, thickness or width of bars and spacing of letters affect the distance from which a sign can be read. These can be reduced to an engineering basis. In addition there are some very peculiar psychological factors involved, such as the variation in size and shape of the image on the retina of a bright spot, such as a lamp, seen at varying distances.

Some very interesting tests were evolved to determine the effect of the many factors upon the ultimate success of a sign.

Illumination and Traffic Accidents

The loss of life in traffic accidents is about twice as great as in railway accidents and more than half of the total industrial loss. It is estimated that the annual personal and property loss in the U. S. is about \$1,000,000,000 from automobile accidents.

From thirty-two cities 800 fatal and 31,000 other accidents were reported. In 1906 there were less than 400 deaths from automobile accidents while in 1920 there were more than 10,000 in the United States. The accidents occurring during the hours of darkness were 30.3 per cent of the total. The greatest number occurred during October between 5 and 6 p. m.

Synchronous Motors for Power-Factor Correction and Voltage Control

By C. V. CHRISTIE, Professor, McGill University.

A valuable paper on the subject of power-factor correction was recently presented before the St. Maurice Valley Section of the Canadian Electrical Association at one of their regular meetings, held in Three Rivers, Que. This paper, by Prof. C. V. Christie, of McGill University, Montreal, we are reproducing in extract, below. The importance of power-factor in its bearing on operating conditions and the distribution of power rates is as yet too little understood.

In introducing the subject, the speaker discussed the various definitions of power-factor as the ratio of

$$\frac{\text{true power}}{\text{apparent power}} = \frac{\text{watts}}{\text{volt amperes}} = \frac{\text{kilowatts}}{\text{kilovolt amperes}} = \frac{\text{active component of current}}{\text{total current}}$$

The more important objections to low power-factor were next taken up under the three headings of

- (a) Increased copper loss.
- (b) Reduction in kilowatt capacity of generators, transformers, lines, etc.
- (c) Increase of voltage drop to be corrected by an increase of generator voltage.
- (a) For a given power output the current increases inversely as the power-factor and the copper loss in the system increases inversely as the square of the power-factor. Thus, if the loss at unity power-factor is taken as 100% the loss at 80% power-factor is

$$\frac{100}{(.8)^2} = 156\%, \text{ and the loss at } 70\% \text{ is } \frac{100}{(.7)^2} = 204\%$$

(b) Generators are designed to deliver their rated current at normal voltage, i.e., they are designed for a certain k.v.a. output. If the load power-factor is low the k.v.a. output of the generator remains approximately constant for the same temperature rise, while the kilowatt output goes down in direct proportion to the power-factor. For example, a 1000 k.v.a. generator can deliver 1000 kw. to a load of unity power-factor provided its prime mover has sufficient capacity. It can only deliver 800 kw. to a load of 80% power-factor. If the load power-factor is as low as 70% it can deliver 700 kw. only if its exciter has sufficient capacity to maintain normal voltage under such a low power-factor.

(c) Lagging current flowing in the generators and also through the reactance of the transmission lines and transformers consumes a large component of voltage, and therefore low power-factor tends to cause low voltage. To counteract this drop of voltage the generator voltage must be raised by increasing its excitation. This requires increased capacity in the exciter.

The following table shows the relation between power-factor and current, reactive k.v.a. and copper loss for a load of 100 kilowatts.

Power Factor	Current	Reactive k.v.a.	Per cent. loss
100	100	0	10.0
99	101	14	10.2
95	105	33	11.0
90	111	49	12.2
85	118	62	13.8
80	125	75	15.6
75	133	88	17.7
70	143	100	20.4

On account of these facts power companies have been reluctantly forced to penalize customers who operate at low power-factor. The purchaser contracts to take power from the company at a definite power-factor, such as 85 per cent. If his average power-factor for the month falls below this value,

he is penalized and is charged for the actual kilowatt hours increased in the ratio

Contract power-factor

Measured power-factor

For instance, if the measured energy consumption is 10,000 kilowatt-hours at 80% power-factor where the contract calls for 85%, the customer is charged for

$$10,000 \times \frac{.85}{.8} = 10,600 \text{ kw. hrs.}$$

and he pays for 600 kw. hrs. as a penalty.

Causes of Low Power-Factor

One of the main causes of low power-factor is the overmotoring of industrial plants. Larger motors are employed than are required to carry the load and as a result the plant power-factor is low. The remedy is to install motors of just sufficient capacity for the work to be done and to buy motors with sufficient overload capacity to take care of abnormal conditions which may exist for short periods.

Where the plant is already in operation and the power-factor is low, it may be improved by installing condensers either in the form of static condensers or in the form of synchronous motors to operate over-excited, to draw leading currents and so to offset the large reactive lagging component of current required for the induction motors.

Where extensions are to be made to the plant the excess load may be carried by the synchronous motor, which has then the double capacity of supplying a mechanical load and of supplying reactive k.v.a. to improve power-factor.

Synchronous Motors for Power-Factor Correction

A synchronous machine built for power-factor correction is commonly referred to as a synchronous condenser. The official name is synchronous phase modifier. They are really generators of reactive k.v.a., and are built in sizes from 100 to 15,000 k.v.a.

When such machines are built to be operated entirely for correcting power-factor and not to carry mechanical load, they are usually built for high speeds and have lighter bearings, bed-plates and shafts, and are correspondingly cheaper than ordinary synchronous machines. They are often designed to be started with oil pressure applied to the bearings, and will then draw less than full load current at start and will not disturb the voltage of the system.

They must be equipped with complete squirrel cage windings to give good starting qualities and also to enable them to hold in step when disturbances occur on the lines, particularly when the motor is operating under-excited, as is often the case when used for voltage control on long transmission lines.

Example

Assume the following daily load:

4 hrs.	500 kw. @ 90% p.f.	250 k.v.a. reactive
8 hrs.	100 kw. @ 40% p.f.	200 k.v.a. reactive
12 hrs.	20 kw. @ 20% p.f.	100 k.v.a. reactive

Reactive k.v.a. hours

$$4 \times 250 = 1000$$

$$8 \times 200 = 1600$$

$$12 \times 100 = 1200$$

4000

kw. hours

$$4 \times 500 = 2000$$

$$8 \times 100 = 800$$

$$12 \times 20 = 240$$

3040

kw. hours

$$\text{p.f. (avg.)} = \frac{\sqrt{[(\text{kw. hrs.})^2 + (\text{reactive k.v.a. hrs.})^2]}}{3040}$$

$$= \frac{\sqrt{(3040^2 + 4000^2)}}{4040} = 0.6 \text{ or } 60\%$$

A 100 kv.a. synchronous motor operating for 24 hours over-excited to draw full leading current would supply $24 \times 100 = 2400$ kv.a. hours reactive and reduce the demand from the power company to $4040 - 2400 = 1640$ kv.a. hours reactive, making the power-factor

$$\frac{3040}{\sqrt{(3040^2 + 1640^2)}} = 0.885 \text{ or } 88.5\%$$

Synchronous Motors for Voltage Control

When used to control the voltage of a transmission line the synchronous condenser should be operated over-excited and drawing its full kv.a. leading at periods of heavy load to raise the receiver voltage, and under-excited and drawing its full lagging kv.a. to lower the voltage at times of light load.

In this way voltage control over the greatest range of load may be obtained, and so the smallest capacity in synchronous condenser may be used for a given service.

The synchronous condenser must be located in the sub-station at the end of the line, where it can draw its leading and lagging currents through the reactance of the transmission lines and transformers, and so have the maximum effect on the voltage.

Constant voltage is maintained at both ends of the line, and so any customers fed at intermediate points will receive power at constant voltage, which is a very important consideration.

The Asynchronous Phase Modifier

Other types of phase modifiers have been developed in Europe to improve the power-factor of induction motor installations. They do not run at synchronous speed and are only used to correct lagging power-factors, and are therefore called asynchronous phase advancers.

Perhaps the simplest form is the Kapp phase advancer, which consists of a d.c. armature and commutator with three sets of brushes at 120° to be connected in series with the windings of a wound rotor induction motor.

When driven at a speed about double that of the slip of the motor the rotor reactance is reversed in sign and becomes a capacity reactance, which can be varied by varying the speed.

The phase advancer fills the place of the exciter of the synchronous motor and supplies magnetizing current, but at such a low frequency and low voltage that the total kv.a. supplied is but a fraction of that to be supplied in the ordinary way.

The kv.a. supplied by the phase advancer bears the same ratio to the kv.a. required from the line as the slip bears to the synchronous speed.

A 1500 h.p. induction motor draws 1350 kv.a. at a power-factor of 88%. The reactive kv.a. from the line is 630.

If the slip is 2% the power-factor of the motor could be increased to 100% by a phase advancer of

$$\frac{2}{100} \times 630 = 15 \text{ kv.a.}$$

driven by a $\frac{1}{2}$ h.p. induction motor. At the same time the capacity of the induction motor would be increased to 1700 h.p.

Such machines are used to a considerable extent in Europe, but have not been introduced into this country.

Mr. F. Jno. Bell Resigns

Announcement is made of the resignation of Mr. F. Jno. Bell as president and general manager of Canada Wire & Cable Company, Toronto, manufacturers of electrical wires and cables, with factories at Leaside, Ontario, and branch offices in different cities of the Dominion from Halifax to Vancouver. Mr. Bell has also resigned as president and general manager of Leaside Engineering Co., which corporation controls the cable company and other firms, including Leaside Munitions Co., manufacturers of shells during the war for the British and American Governments. Prior to joining the cable company in 1913 Mr. Bell was general manager and secretary of British Canadian Power Co., supplying electric power and compressed air to the silver mines of Cobalt and South Lorain in the Northern Ontario Mining District.

Geo. White Becomes a Member of Garry Mfg. Co.

Major Geo. G. White, who for nearly 18 years acted in the capacity of office and credit manager for Donald H. Bain, has abandoned groceries for electrical appliances. Early in 1915 Major White went overseas with the 78th Batt. as lieutenant; later he was transferred to Brigade Machine Guns and was one of the first machine gun officers with the Canadians in France. He was appointed captain in 1916 and major in the spring of 1918.

Major White was twice wounded while overseas, once at St. Eloi and again at Sanctuary Wood in 1916. After returning to duty he took charge of the purchase of all



Major Geo. G. White

food supplies for the Canadian army and later was appointed assistant director of contracts having supervision of the purchase of all supplies, including mechanical transport, stationery, food, clothing and all other ordnance supplies. After the armistice Major White was detained in England in connection with the disposal of surplus stores from the army. Returning to Canada in 1919 he resumed connection with Donald H. Bain but has now resigned to take over the office of secretary-treasurer of the Garry Manufacturing Co. Ltd., Winnipeg, manufacturers of electric fixtures, brass and copper work, etc. R. C. Ward, late president of this company has resigned from the firm.

An Electrical Pioneer

A link with the great Faraday, who was the scientific founder of the electrical industry, has been broken by the death recently in England of Mr. S. A. Varley at the age of 90. Varley received his first inspiration from the lectures of Faraday at the Royal Institution, London, and he played an active part in the laying of the first Atlantic cable. During the Crimean War he laid, for the first time in military history, a field electric telegraph for war purposes. He was also the originator of the time ball at Greenwich Observatory and elsewhere, for giving time signals visible to the public. Still more important was his invention of the compound wound dynamo.

Mr. M. W. Beach, Iroquois, Ont., is asking for prices on cedar poles, cross arms, wire, and all material required for approximately ten miles of transmission line.

Wide Field of Service for the Engineering Institute

**Mr. Geo. T. Clark, Chairman of the Toronto Branch of the E. I. C.,
in his Inaugural Address on October 13, Sets High
Standard for This Year's Activities**

The possibilities for real accomplishment by the Toronto branch during the coming winter are, it seems to me, greater than they have ever been in the history of the branch. It is true perhaps that the activities of the branch are limited to a certain extent by the general policies adopted by the headquarters of the institute, yet the individual branches to-day are given a good deal of latitude and are allowed, and rightly so, to largely manage their own affairs and work out their own problems.

The scope of the institute has broadened out materially since its name was changed from "The Canadian Society of Civil Engineers." There was a time when the meaning of the word civil engineer was so broad as to embrace every possible line of engineering work, and was used to distinguish from military engineering. During that time the Canadian Society of Civil Engineers could have been justly considered as truly representative of all its members no matter in what special branch of engineering they were engaged. There was also a time when the mere interchange of technical knowledge among the members of a technical society was of sufficient interest to sustain such an organization in an active condition. But times have changed. The engineering profession has broadened out to an enormous extent; numerous new branches and activities in the profession have been created. Civil engineering itself has become narrowed down to mean and include only certain, definite and limited lines of engineering undertakings. Other lines of engineering, equally as important, have become developed and justly demanded independent recognition and designations as major branches of engineering, such as mechanical, electrical, mining and chemical. It was no longer possible to include all members of the profession under the title of civil engineering, and it becomes imperative to change the name of the society so as to make it unmistakably representative of the entire profession. It was thus that the name of the Engineering Institute of Canada came into being.

Likewise the activities of the Canadian Society of Civil Engineers, which were limited chiefly to interchange of technical knowledge among its members, were beginning to lose their attraction in the eyes of the new members, particularly the younger men. With the limited and narrow activities it was no longer possible to create sufficient enthusiasm to warrant the growth and expansion which such an organization requires in order to live. Changed conditions brought about by economic developments in recent years made it quite evident that above all the engineer is human, and in addition to the technical problems that he meets with in his daily work he also has other problems, in common with the members of all other professions and classes in the community, which should receive his earnest attention. It became apparent that if the Canadian Society of Civil Engineers was destined to become the leading organization of the engineering profession in Canada it must assist its members in the solution of their human problems as well as their technical problems even if to do so it might have to abandon some of its old traditions and recognized policies.

It is generally recognized, I believe, that the reorganiza-

tion of the Canadian Society of Civil Engineers into the Engineering Institute of Canada paved the way for broader activities in new spheres which will ultimately result in greater usefulness of the institute to the individual members, and of the members of the institute to the general public. Our organization as founded and in existence to-day is, it seems to me, bound to be successful, because its constitution is flexible enough to be capable of adjustment to the constantly changing conditions and requirements of its members.

To justify its existence then the institute and all its activities must be dominated by the desire and the determination, backed up by the individual effort of every member, to be of service, first to its own members, and secondly to the general public.

Service

In what way can the Toronto branch be of service to its members.

1. By facilitating the acquirement and interchange of professional and general knowledge among its members.

I have always been of the opinion that if we would substitute papers of general knowledge for some of the most technical type, our weekly meetings would be more acceptable to the majority of the members. Having that idea in mind the subjects chosen for this year's programme include public health, finance, park treatment, contract law, city planning, transportation, as well as technical papers covering all branches of engineering work.

2. By promoting the professional interests of the members.
 - (a) By securing proper recognition for the profession.

As a result of concerted effort, engineers have already succeeded in obtaining special legislation in all but three provinces of the Dominion. This special legislation is primarily intended to serve one main purpose, namely, to protect both the public and the profession from the results of the practice of engineering by those not qualified. If this principle is rigidly applied to any engineering legislation that may be framed it will be found that the engineer has received his full measure of protection. All that engineers as a class are entitled to is some effective means of protecting their professional reputation and prestige. Legislation has been framed to meet this end and so framed as to be for, and not at the expense of, the public weal. Anything beyond this may be defined as class legislation, which in the final analysis does not protect, but stigmatizes, and would ultimately force the engineer into the position of having to protect his legislation instead of having his legislation protect him.

In the province of Ontario last session the Advisory Conference Committee, the Ontario Provincial Division and the various branches expended a great deal of time and effort on an Engineers' Bill for this province. Unfortunately it was submitted to the government too late to be considered by the Private Bills Committee and had to be referred to a special committee, which did not report before the close of the session. There did not seem to be any particular opposition to the bill itself, and I believe we are justified in believing that we will

attain our objective during this session of the Legislature, provided every member of the institute in this province uses every means in his power to further the interests of the bill.

- (b) By securing proper remuneration for engineering service.

A great deal has been said and written on this important topic during the past two years, and perhaps no single subject has received as much attention and consideration from the various branches as the question of classification of and compensation for engineers. The Toronto branch was the first, I believe, to submit a report on this matter. The report of the special committee was approved by the branch and submitted to headquarters, and since that time a number of other branches have forwarded similar reports. Headquarters then decided, through their committee on policy, that it was a matter which they should take up. As a result of this action a committee on remuneration was appointed by the council to study the whole question, using as a base the reports of the various branches and having access to the schedule prepared by the Engineering Council of New York. Their findings have not yet been made public.

Remuneration

There is no doubt but that the problem of adequate remuneration is a difficult and complex one. The subject is closely allied with the whole question of economics, which in turn is an important phase of the problem of production. The production of the engineer is evident in constructing means of transportation whether by rail or water, in the development of an irrigation project, in the inventing and perfecting of machinery, in the generation and transmission of electrical energy, in obtaining from the earth its store of mineral wealth, or in the chemical analysis of the metals and kindred building products. In every one of these processes, the main objective is to obtain an adequate return on the money invested, and the engineer is depended upon to produce the desired result, and every detail in his daily work is thought out from the standpoint of economics. Probably a foreman with no technical training could design a steel bridge that would carry a train. The qualified engineer gets the same results, but uses ten or twenty per cent. less metal. The saving is not only to his principals, but to the nation in the conservation of natural resources. This principle of economics enters into the daily life of the engineer more than into that of any other profession, and assuming the above statements to be correct, who is better qualified to deal with the big economic problems than the engineer?

At the present time the entire world is undergoing a period of economic readjustment, which has thrown everything out of balance. Uncertainty as to what the future may bring is affecting business relations. The wheels of industry are certainly not running smoothly, and not only individuals, but whole nations are suffering as the result of adverse trade conditions. In such a chaotic condition of affairs one naturally asks the question what service could engineers render to ameliorate these conditions, to assist in speeding up the readjustment and to clear away some of the clouds of uncertainty that are dimming our vision. How tremendously worth while it would be if the engineering profession would grapple with and assist in solving this acute problem, and having done so who would deny us a remuneration comparable with the service rendered? Let us place a higher estimate on our own value to the community, not only in our professional relations, but in all matters of community interest, and employers of engineers, as well as the public, will be quick to accept us at our own valuation.

3. By maintaining high standards in the profession.

The committee on ethics, under the chairmanship of Mr. Mylrea, presented two reports to the branch last year on a

code of ethics for engineers. The committee will report further in the near future. Other engineering organizations are also attempting to write new codes of ethics. These efforts are, it would seem, a hopeful sign of progress, not necessarily because it will produce a good code of ethics, but because it will increase the thought which engineers will devote to the ethics of their relations to fellow-engineers and to the public.

It is inevitable that each one of these engineers, by virtue of such reflection, will become more keenly conscious of the special public trust with which he is charged by reason of his profession's place in community existence. Therefore, even without the production of an accepted code, co-operative study of the subject will yield benefits to the public as well as to the profession by quickening the professional conscience and recognition of the duty of service.

In addition to this, it is broadly true that any movement which aims to re-formulate basic principles of just conduct is of very special value at the present time, since the engineers' objective attitude is most essential to the world's reconstruction.

There is another thought that occurs to me in connection with this question of ethics, particularly in regard to our relation to the public. Why do engineers frequently harbor personal feelings against those with whom they disagree on technical matters? Engineers are perhaps more sensitive regarding disagreements of opinion than other classes, because they are accustomed to dealing with facts and with immutable natural laws. He feels instinctively that there is about everything a definite position which must be right; what differs from it is wrong. There is, of course, a right and wrong to every question, but the difficulty is that most problems are so complex that we are unable, with absolute correctness, to appraise the value of each factor. Some problems are subject to exact mathematical determination, but by far the greater number of them call for the application of the standards of individual experience; in other words, of judgment.

We need, therefore, to realize that our opponent in the discussion may have as good ground as we for his conclusions, and to derive from that reflection an attitude of tolerance, and respect, for opposing views. Above all, we need to regard problems as objective and to refrain, unless the grounds are very clear, from imputing motives to our opponents. Let there be fair, even strenuous discussion, but let the personal relations be in nowise disturbed.

4. By giving due publicity to the work of the profession.

The ordinary means of obtaining publicity for the engineering profession are fully numerous. The outstanding requirement under this head is for engineers as a class to participate in the affairs of federal and provincial government. This contention is so fundamentally sound and so generally recognized that it is not necessary to enlarge upon it. It is true beyond argument that the recognition of the engineer as related to national affairs cannot be advanced or conserved unless the engineers themselves exercise active governmental functions in connection with the laws relating to, or incidentally affecting, the profession.

Show Interest in General Problems

Among other channels of publicity may be mentioned the active participation of engineers in all general problems affecting the life of the community, and in developing such problems into specific schemes for government ratification and administration. Conditions governing publicity in the broad sense demand that engineers identify themselves with all beneficent movements and projects, particularly those which have a wide public appeal.

During the annual convention of the Engineering Institute of Canada in Toronto last February, the engineering profession received more newspaper publicity in three days than

it had during any previous similar period in its existence. Recognizing, as they must, the work of the engineer in the community, there is no reason why the daily press should not give our weekly meetings a proportionate amount of publicity. This, however, is one point in which we conflict with the policy of the institute headquarters, as the Journal will not publish any paper, a synopsis of which has been given to the daily press. It is a question on which there is room for honest difference of opinion. My own view is that more benefit will accrue to the profession by the publicity we receive in the daily press than by the publication of these papers in the Journal, where none but the engineer will ever see them. However, I am satisfied to leave the matter in the hands of the publicity committee under the chairmanship of Professor C. R. Young, to do whatever they think best.

There is another question which should, I believe, receive the attention of this committee. Very frequently in the newspapers, innuendo and quoted surmises, by those unqualified to make them, causes a distrust in regard to the works of the engineer which is entirely unwarranted. A published statement of the facts of the case by this committee would go a long way towards retaining the confidence of the public in the work of the profession.

Finance

For the first time in the history of the branch we have considered it advisable to appoint a finance committee, of which Col. Lamb is chairman. This committee will examine and O.K. all bills for payment. They will be responsible for the collection of back dues. They will also have the opportunity of making an effort to increase our revenue through increased advertising in the Journal.

The question was also raised at the annual meeting last winter as to the advisability or otherwise of increasing the annual dues. This question might well receive the attention of the finance committee, and I would suggest that they report to the branch on the matter some time before the annual meeting in Winnipeg.

It will interest the members to know that the annual convention committee, under the chairmanship of Col. Lamb, has handed to the branch the amount of the surplus from the last annual meeting, a total of \$360.00.

Membership and Reception

Your executive has deemed it advisable to combine the membership and reception committees in one. The duties assigned to it are to see that those who attend the weekly meetings become personally acquainted and that the membership in the branch be increased in all its classes. Mr. Wynne-Roberts, chairman of this committee, was very active along both these lines last season, and we can be confident, I am sure, of splendid results.

Some dissatisfaction has been expressed from time to time in regard to the present classification of membership in the institute. This committee might very well consider this matter and prepare a suggestion to be submitted at the annual meeting.

Zoning is a subject which has attained much popularity in recent years among engineers, architects and indeed among all classes who have an interest in the general welfare of their home community. You have no doubt noticed that Mr. Seymour, who is chairman of this committee of our branch, is editing regularly a special column in the Institute Journal dealing with this question. It is very desirable that this committee should continue its work, and we are anticipating during the session an interesting discussion on this subject, as well as one by Mr. Crossley's committee on social service.

Unemployment

During the winter of 1920-21 there was considerable unemployment among engineers, and a committee was appointed,

of which Mr. Jack was chairman, with the object of keeping in close touch with employers of engineering services in the hope that some service might be rendered to those out of employment. We are all fully aware that, from present indications, conditions will be even worse than last year. I am free to confess that personally I am unable to suggest any practical solution to this tremendous problem. Through our committee every effort will be made to place our members where there are vacancies, but without being too pessimistic, I am afraid those vacancies are going to be very scarce. Whether the establishment of a fund administered to provide temporary financial aid to those in need is practical or not remains with the branch to say.

The by-laws, fees and library committees are all important integral parts of the organization which we have attempted to build up in the past, and which are still carrying on and as a result of whose work benefits will accrue directly or indirectly to every member of the branch.

Nor must we forget the social side of our responsibility. There is perhaps no better way of getting our membership personally interested in each other than by the holding of social functions. The suggestion has been made to have one large engineering function in which all branches of the profession might co-operate. If the idea meets with your approval, I would suggest that the branch be authorized to night to invite a conference with other engineering bodies with this object in view.

In regard to the service which the members of the Engineering Institute of Canada can render to the general public, to their home community and to the nation, the problems which Canada has to face in the immediate future are problems in the solution of which the engineer must play an important part. The influx of foreign population, which will be great, is bound to create a situation to deal with which will require the utmost wisdom.

Engineers Should be Leaders

We as engineers should see to it that we are not in danger of repeating the discreditable slum conditions prevailing in the old world, conditions which are productive of disease and physical and moral deterioration. The engineering profession should be able to do more than any other to advise measures to deal with this problem. It means improved methods of economical house construction. It means good roads at moderate cost. It means a scientific planning of streets and parks, and it means a rapid transportation system with moderate fares to relieve the congested districts. The incoming immigrant must be Canadianized, and in what better way can this be accomplished than by showing him that the new conditions in which he will live in Canada are infinitely better than those he left behind. The trained intelligence of the engineer will always be a factor in the solving of this most difficult question.

The second way in which members of the institute can be of service to the nation is in regard to the present industrial situation. One of the important factors of present-day industrial stagnation is the high cost of construction, and yet there has been very little organized effort on the part of engineers to promote construction activity. There is a growing feeling, however, that engineers should become leaders in political economy and a strong conviction that the time is opportune for engineering organizations to take the leadership in persuading the public to support every truly economic plan for public works.

The assuming of such a leadership by engineers would be well-timed, because the recent war has taught the public much about the importance of engineering, and because the present business depression makes it generally evident that a revival of construction activity will assist in accelerating the wheels of industry.



The Electrical Contractor

Establishing Electric Service for Rural Customers

BY C. W. DRAKE

General Engineer, Westinghouse Co.

When the subject of farm electrification first came to the attention of the central station engineers, they very naturally attempted to apply electric power to every machine which required power, regardless of how often or for how long it might be used. Although it is entirely possible to make satisfactory motor applications for every machine on the farm, experience has shown that the load factor of some machines is so low that the energy consumed does not warrant the investment required to supply the demand. Most engineers now agree that such work as threshing and ensilage cutting which requires from 10 to 25 h. p. for only two or three days a year can be more economically done by a tractor. This work is done in some communities by a portable electric equipment consisting of a motor and transformers with suitable switching equipment so that it may be moved as a unit from farm to farm and connected to the transmission line. Such an outfit is quite special and would not be considered feasible except in a farming district of considerable extent. Feed grinding is often done by the tractor as it seldom requires more than four or five hours per month, but at the same time this makes a desirable central station load if a mill is used which may be driven by a motor of 2 h.p. or less. This will not increase the maximum demand or the transformer capacity required, yet will materially add to the energy consumed per month.

We are gradually finding out that the desires and needs of our friends on the farm are not materially different from those living in the cities, except in some of the special motor applications. Electric light to replace the dangerous and dim kerosene lamp and lantern is always the first factor and closely following is the desire for a running water supply. Besides these two items most of the common household appliances, especially the washing machine, quickly demonstrate their labor saving features and around the barn and dairy, motor driven milking machines, cream separators, churns, grindstones, etc. make the work easier and do it better and quicker.

The gas engine driven farm unit has done much good for the electrical industry since it has proven to thousands of people how electrical apparatus can improve conditions and reduce the burdens of farm life. These units have done the pioneer electrical work and probably always will have a place on the frontier in advance of electric transmission lines. Experience in the West has shown, however, that these units simply created a desire for the more extensive and unlimited use of electric power and that as soon as the central station service could be obtained there was little hesitancy in shutting down or disposing of the gas engine outfit.

A recent editorial mentions that of the men who left the army when the war was over less than 2 per cent went back to the farms. If approximately 50 per cent of our popula-

tion is rural it is evident that farm life is not sufficiently attractive to these young men to take them back after once having been away. Electric power and light banish the worst drudgery of farming for both men and women and should do much to make farm life more attractive, especially for those who were once accustomed to it.

So it is that at present we should really consider the farmer as coming to the central station and asking for or demanding power rather than the central station going out and soliciting it. The average farmer knows that electric service will cost him more than it would in the city and is willing to pay a fair and reasonable price, but is wholly ignorant of the problems that enter into this service. Some central station men also know little about the actual cost of this service and it is only after exhaustive study of all factors that a rate is obtained which nets a profit to the central station, which is satisfactory to the user and which also tends to increase rather than decrease the use of energy. Probably one of the most common and readily understandable rates is that based upon the urban charge for similar service plus an additional charge which covers the extra expense entailed for extending this service into the country. However, before the question of rates can be considered it is necessary to understand just what work is involved, how this is to be financed and executed, how the equipment is to be maintained and last but not least, how to present this in a clear and concise contract so that there may be no misunderstanding after the work is completed. There are probably nearly as many systems of building and financing rural lines as there are lines in existence, so that this paper will attempt only to describe what seems to be the latest practice as indicated by various utility and commission reports.

Voltage and Phase

Although many 2300 volt lines are in use and giving satisfactory service, it is generally felt that this is not high enough for extensive development and that new construction work should provide for either 4000 or 6900 volts and in some cases for even 13,800 volts. At present 6900 seems to meet the conditions in most localities and is rapidly becoming the standard for rural extensions. The voltage and phase should not be determined solely by the demand of a single community, but should be so chosen that if a community or town several miles beyond desires service at a later date the previous construction will be suitable. Consideration should also be given to the possible interconnection with other systems which at present may appear only a remote possibility. As 3 phase power is desired in most towns for the water pumping plants and for other comparatively large applications, the pole construction should permit the installation of a 3 phase line, although only two wires may be run at first.

Construction of Pole Lines

In order to ensure continuity of service with the least maintenance, it is acknowledged that the lines must be built strictly in accordance with engineering specifications and in most cases these are now supplied by the utility which

will furnish the electric service. This insures the use of standard apparatus throughout the district which decreases the number of repairs to be carried out and increases the reliability of the service. Since the rural lines are often simply extensions of urban lines the same type of construction may be used and at the present time many central stations are in a position and prefer to construct these lines themselves, while others prefer to let contractors do it. It is generally acknowledged that the utilities cannot afford to have any capital invested in these lines and that the entire cost of the line except for the meters should be borne by the farmers desiring the service. Whether a company is formed by the farmers to handle this business or whether the central station deals through a contractor or directly with the individual farmers, is a matter to be settled locally as is also the arrangement for adding customers to the line after it is completed. The bare cost of these lines will vary with the voltage and type of construction used, also with the contour of the country, but averages from \$700 to \$1000 per mile not including engineering or overhead expenses. Numerous quotations less than this are often seen, but it is usually found that these either cover inferior materials or workmanship or may omit many items, such as clearing, right of way, crossings, etc. Specifications issued by various commissions recommend the use of not less than 25 foot poles of white cedar, 6 inches at the top and cross arms of Washington fir with locust pins. No. 6 bare copper wire or larger should be used, stranded where crossing railroads or main telephone lines. Utilities should be careful in estimating the construction cost of these lines so that it will not be necessary to make additional collections after the construction work is completed. Although 25 foot poles are the shortest allowed, most companies prefer 30 foot poles and find that with the longer span possible there is very little difference in the cost of the line.

There are three methods of distributing power to rural customers from high tension lines; first, by a distribution line paralleling the transmission line for its entire length; second, by individual transformers for each customer or group of customers, and third, by a combination of these two methods with distribution lines running each way from the various step-down points. From an operating standpoint and for continuity of service the distribution line parallel to the high tension line for its entire distance is the best. However, this method is usually the most expensive, especially if the customers are widely scattered. The second method, using direct transformation for each customer, causes a very high cost for transformers, and this increases with the voltage of the transmission line. Besides this, every tap on a high tension line makes a possible source of trouble. Theoretically there is no limit to the ratio of transformation which can be safely and satisfactorily used. However, from a commercial standpoint the cost of small transformers for high voltage makes them impracticable for general service and such transformations as from 22,000 or 33,000 volts to 230/115 volts is justified only in exceptional cases. Even in the case of 13,800 volts if there are a number of customers to be served not too widely scattered, it may be found economical to step down and distribute at 2300 volts instead of tapping the 13,800 volt line for each customer. In making a comparison of the two systems it is necessary to consider not only the cost of the pole line itself, but also the cost of the transformers and the lightning protective apparatus. The smallest commercial transformer for 13,800 volts is 2½ k.v.a., which costs more than three times as much as the 1½ k.v.a., and twice as much as the 3 k.v.a. transformer for 2300 volts. The 13,800 volt transformer costs about 75 per cent more than the 1½ k.v.a. and 40 per cent more than the 3 k.v. a. transformer for 6900 volts.

Lightning Protection

Line protection is a much debated question and due to different climatic conditions in various parts of the country, some companies are able to give service with a much smaller and cheaper protective equipment than others. Lightning protection is somewhat like life insurance, that is, a limited protection can be obtained for a small amount of money but more complete protection can be obtained by paying more. The overhead ground wire used by many companies makes a very flexible arrangement with 3 phase, 4 wire, 4000 volt systems, since for the single phase taps the ground wire and one line are used giving 2300 volt service. This neutral wire for best protection should be grounded at each pole and this is usually done by running the wire down the pole before setting and fastening it either in spiral or zigzag across the butt. Each transformer installation should be equipped with lightning arresters and fuses and separate ground wires should be installed for the transformer and for the lightning arrester.

For this service a special farm line switch has been developed, which embodies a horn gap arrester with series resistance, easily replaceable fuses of the expulsion type and a disconnecting switch. This unit is arranged to be operated from the base of the pole and may be locked either in the open or closed position. The transformers and fuses are readily disconnected from the line in case it is necessary to replace fuses or make repairs. This type of switch is also very desirable for use with small transformer sub-stations and is recommended for all farm service. In case of small farm transformer installations the cost of this combination switch is sometimes too great a proportion of the total installation, in which case separate lightning arresters and fuses are mounted on the pole and the disconnecting switches are omitted. The type of arrester will depend upon the line voltage, but on voltages below 6900 volts the horn gap arrester is not recommended since it does not give as complete or reliable protection to the transformers and other apparatus. For 2300 volt lines arresters of the multiple gap type with series resistance or other similar types give better protection. One of the most serious problems with such an installation is the replacement of fuses after a heavy storm and it is usually necessary to arrange with local contractors for this work or arrange the fuses so that they may be readily replaced by the farmers themselves. The use of the combination switch greatly simplifies this operation.

Transformer Capacity and Losses

In view of the large number of small transformers installed on such lines, it is essential that the smallest permissible transformers be used in order to reduce the line and core losses to a minimum and also to maintain as high a power-factor as possible. Some interesting statistics collected by the Wisconsin Commission indicate an average connected lighting and iron load of 1.2 kw. and a power load of 1 kw. per customer. Since it is practically impossible to have all the lights, the iron and motors operating at the same time it is evident that a 1½ k.v.a. transformer is suitable for the average installation and that the 3 k.v.a. size will take care of quite extensive farm work. The report also shows that of 163,000 kw. hours delivered to the extensions in one year only 71,000 kw. hours were metered or there was a loss of about 56 per cent which includes both the line and transformer losses. If the losses in ordinary urban distribution are considered as 20 per cent then the extra losses chargeable to rural service were 36 per cent and the rates must take this into consideration.

It is hoped that the above discussion will show that from an engineering standpoint similar factors must be considered

in building rural extensions as in building usual distribution lines, and that standard materials and types of construction should be used. There is no doubt about the extent of the possibilities and it is only a question of arranging for the financing of these lines and the formulation of proper rates before the country power lines begin to take on the appearance and extent of the rural telephone lines.

A Modern Electrically Equipped Office Building

The head offices of the Dominion Cannery Ltd., Hamilton, had become entirely inadequate for this important industry; new quarters had to be obtained. The building which formerly housed the Branch Office and exchange of the Bell Telephone Co., of Hughson Street South, was inspected and with alterations was found to be an ideal building for this company.

The basement of the building was provided with large windows on the street side which made it possible to use this space for offices. A modern heating plant was installed. Large cloak rooms and rest rooms were provided for the accommodation of the employees.

Each floor is supplied with a large fireproof vault equipped with the most modern type of steel shelving and lockers. A modern printing plant is installed in the basement to look after the printing of stationery. All the machines are individually driven by motors direct connected to the presses.

In the basement a fireproof room was provided for the accommodation of all the telephone apparatus and storage batteries. This room contains the Northern Automatic Telephone Exchange for intercommunication throughout the building. The capacity of this exchange is, ultimately, fifty phones. The exchange is entirely automatic in every detail. A power panel is provided for the automatic control of battery charging. The automatic ringing machine is mounted on this panel, with the necessary meters and magnet control switches. The entire exchange is enclosed in a suitable glass case to keep it dustproof.

A Holtzer-Cabot motor-generator set is used for charging the storage batteries of the telephone exchange. The exchange is provided with an Automatic Code Calling machine which is connected to buzzers and bells throughout the building at different points. This machine is used for calling the different executives throughout the building. By the use of it and a special conference line the executives may hold a conference without leaving their desks. This is a great convenience and saves a great deal of time.

The ground floor is provided with a large waiting room, enquiry desk, Board Room for directors, stenographers' room, and several private offices for the executives. The stenographers' room was specially designed and equipped to prevent the noise of the machines interfering with the efficiency of the employees in the other offices.

The entire first floor was altered to provide a large general office for the Audit Department, Purchasing Department and general accounting.

The entire building is equipped with side wall receptacles, for the use of motor-driven office equipment, at every convenient point. Duplex Arrow E. receptacles were used for this purpose.

A special form of baseboard was used which could be easily removed. This was used to enclose all telephone and call-bell wires. Benjamin-Starrett panels were used to control the branch circuits on each floor.

The specification of the owners was that it was not intended to use any desk lamps in the building. The lighting system and fixtures were designed to provide a general illumination that would meet these requirements. The Four-in-One unit was selected after exhaustive investigation and tests, to be the unit most suitable for all purposes. 300 watt units were installed in the private offices and the general office, mounted 10 feet from the floor, spaced 10 feet centres, giving an average of 8 foot candles on the working plane. The units in the private offices and the Board Room were provided with a special old gold finish of the Gothic Period.



View of Dominion Cannery's Offices

Facilities for electric cooking were provided in the rest rooms for the use of the employees.

The alterations to the building were made by the W. H. Yates Construction Co., Hamilton, including the electrical installation. The automatic telephone equipment was supplied and installed by the Automatic Telephone and Recorders Co. Ltd. Toronto, Ontario. The Bell Telephone Co. installed the public exchange with phones throughout the building. The Northern Electric Company supplied the fixtures. The alterations were designed and supervised by Mr. Gordon Hutton, architect & engineer, Bank of Hamilton Building, Hamilton, Ontario.

For the information contained in the above article we are indebted to Mr. V. K. Stalford, Hamilton.

Reaffirms Former Resolution

The Advisory Council of the British Columbia Electrical Co-Operative Association, Vancouver, B. C., recently passed the following resolution:

That this association reaffirms its resolution passed on May 2, 1921, disapproving of the principle of selling electric irons at a cut price, and extends this disapproval to the selling of all lines of electric appliances having a re-sale price, at cut prices, being of the opinion that such sales demoralize the trade and that, where possible, price reductions should be of a permanent nature.

A wireless telegraph set, complete and of professional or commercial size, valued at \$500, originally, has been sold by the Marconi Company, to the Vancouver Technical School, at a price of \$125. The set was formerly installed on the SS. Princess Patricia of the C. P. R. Coast service.



BETTER MERCHANDISING



Common-Sense Merchandising

**Advertising, Salesmanship and Service—
Too Many Mere “Order-Takers”—Be
Something More Than a
Phonograph.**

The first meeting of the season, of the Toronto Section of the Ontario Association of Electrical Contractors and Dealers, held on the evening of October 11, was a happy combination of business and pleasure. The program consisted of a good dinner, followed by routine business of the Association, and then an address by Mr. Casey, of Chicago, Vice-President of the Hurley Machine Company.

Mr. Casey spoke on “Common-sense Merchandising.” In his introductory remarks he emphasized the fact that “sales” are the prime root of merchandising; sales value must be appreciated, as must also the difference between the customer who comes in to buy and the one who must be “sold.” He pointed out that the business of electrical merchandising is less than twenty years old and that, in consequence, its sales methods are not so well established as the methods which obtain in other lines of business of greater age.

In the matter of buying, too, a successful retailer must analyze the salesman who approaches him and consider whether he represents a firm whose goods are of substantial quality. Goodwill is an indefinable thing but may be termed approximately the “confidence of the buying public;” it may be obtained by handling the right kind of merchandise.

If we have the right kind of merchandise and we are ready to do business, the great question arises—how are we going to sell this merchandise? How are we going to build up a business? And you will find if you investigate the matter, if you study the situation a while, that you will come to the conclusion that there are three points which are absolutely essential to your success, three points which are so necessary that they form a sort of foundation for your activities, and those three points are,

Advertising,
Salesmanship and
Service.

Advertising brings people into the store, Salesmanship sells the goods. And the right kind of Service brings the customer back to buy again.

We can't hope to succeed in any retail store unless we do a certain amount of newspaper advertising. We must have advertising. Without it no business can ever make the progress that it should make.

Most dealers are convinced about the value of newspaper advertising and know they must have it. But I want to call your attention to two other means of advertising which I think are not being followed closely enough by the electrical merchant.

Advertising serves one function and one function only, and that is to bring people into the store. If it does that you can't ask more from it.

Use the Telephone

But in addition to the newspapers you can bring people

into your stores by using the telephone and by using the mails. Any man can figure out a nice little talk to use over the telephone to get people interested in any certain appliance which he wishes to move, but all that should be done over the telephone is to try to get the customer sufficiently interested to come into the store. It is a mistake to try to sell the appliance over the telephone. It can't be done. If we can only bring them into the store through this use of the telephone then we should be satisfied that we have done a good job.

And the use of the mail. How many of us are using the mail as we should? How many of us are sending out enough mail matter? How many of us think of writing a little sales letter on any certain article and sending it out to the customer that we think might be interested? And if we are doing that kind of work, or if the manufacturer is doing it for us, how many of us are using the right kind of a personal follow-up, getting a personal touch—the personal element—into the follow-up so that we will capitalize the interest that has been created either on the telephone or in the sales letter?

Salesmanship

And then we come to one of our real problems—Salesmanship. What kind of salesmanship do we find in our electrical stores? What kind of effort is being put forth by the people who meet the public to interest them in the appliances that we are showing and to capitalize that interest for the sake of the proprietor and the cash drawer? Let me show you a little illustration of that.

Here is an electrical store with a washing machine right in the middle of it—and I use the washing machine as an illustration because it is one of the highest-priced articles that you sell in your stores, and every merchant who is alive to his job should be most anxious to move the highest-priced merchandise to get a quick turnover on it. Now, understand that this is one of the appliances that we are most anxious to sell and consequently our sales methods ought to be better on this than they are on some of the smaller things.

Well, the washing machine is here (illustrating) and in walks a customer. I don't know why she came in; it doesn't make any difference, but here she is and she stops beside the washing machine.

Immediately some bright, ambitious young man walks up to this customer and says, “Madam, are you interested in this machine?” What does Madam say? “No”—almost invariably the lady says “No.” But tell me, if she is not interested, why did she stop? Why is she looking at that machine if she is not interested in it? Some people will say, curiosity. All right, let us assume that it is curiosity. Isn't curiosity a certain form of interest?

But the main fact is that it is none of the boy's business whether she is interested. It doesn't concern him in any way whatever whether she was interested when she came in, but it is his business to know that she is interested when she goes out. That is what he is there for. That is the only thing that keeps him in his job—to interest people in the merchandise that is being sold in that store and to develop that interest to a point where they can turn it into money, where they can make people buy because of the interest

that has been created and developed until it means orders.

Never let Customer Say "No"

Now, why should the boy waste his time asking that question? Just think of the position he places himself in. He says to the customer, "Are you interested?" She says, "No," and he is through. He can't talk any more. What can he say? Is he going to keep on talking about this machine and thereby show the woman that he assumes she is lying? That is what it amounts to if he says any more about it. That is just the position he places himself in. And that isn't the worst of it.

He has violated a rule of salesmanship that is as old as salesmanship itself and that is, that no customer should ever be asked a leading question which can be answered "No," if "No" means that you are through and you can't go on talking any more.

Now, why can't the young man say to that woman, "Lady, won't you please stand over here and let me show you where we put the clothes; let me show you how this machine washes; let me show you this little switch; put your thumb on it and see how easy it is to move that switch, that is what turns on the current in the machine." Oh, there are so many things that boy could have said that would have caught that woman's attention, that would have held her interest until he could have told her a few things that would make her want to have that washing machine in her home! That is salesmanship—not asking silly questions like "Are you interested?" when we know that that woman is interested, when we know that nothing else would cause her to stop and look at that machine—wasting her time and ours.

And yet it goes on all over the continent. That question has been asked to-day, "Are you interested?" when it is of no consequence whether she is or not. The job of the salesman is to see that he gets her interested and to see that he develops that interest to a point where she is willing to spend her money for the appliance.

What is a 'Sale'?

Let's look at another instance. Same store, same customer, same boy. The lady wants to buy a socket—an ordinary key socket that sells for fifty cents. The boy takes it down out of the box; he wraps it up and hands it to the lady, then drops the fifty cents into the cash drawer and says, "I have made a sale." Has he? Has he sold anything? Not a thing. A customer came into the store and made a purchase. The lady bought something, but he hasn't sold her anything, and yet here he is surrounded by merchandise that will interest this woman—merchandise that this lady would like to have in her home, and the thought never enters the boy's head. "Well, I ought to show her a vacuum cleaner or flatiron, or a curling iron, or a toaster," or any one of a dozen other things that the woman ought to have in her home.

If you walk into any haberdashery store in this city and tell the boy behind the counter that you want a collar, what does he say to you? "Here are the styles, which do you prefer?" After you tell him the style and the size, the boy takes the collar out of the box and sets it down on a piece of paper, but does he wrap it up and say twenty-five cents or forty cents whatever the price is?

Every man in the room can answer; every man here knows that he absolutely does not do anything of the kind. He immediately tries to sell something to that man who asks for a collar. You are shown a necktie, come shirts, handkerchiefs, socks; maybe it is only a belt, but that boy will try to sell something to you before you leave his store. And why? Because he is a salesman; because that is one of the lines of business that has years of experience behind it and in all these years these people have learned that they

must capitalize every customer that comes in the door—that the only customer, the only person who means anything to them is the person inside their doors. They know they can't sell the people on the street.

A Customer in the Store is Half Sold

They know the people in the street cars and automobiles mean nothing to them until they can get some means of bringing them in the door, and once they get them inside the door, that is the time to make sales—that is the time to take their money away from them—that is the opportunity to give them merchandise that is so satisfactory that they are going to desire to come back and buy more.

Why can't we get that kind of salesmanship into our electrical stores? Why can't we learn, first of all, the salesmanship, the merchandising that is used in these other stores, become thoroughly familiar with it ourselves and then see that the people who work for us are following the right lines when they talk to our customers?

Why couldn't that boy say to this woman when she bought her socket, "Lady, won't you step over here and let me show you this new washing machine," or "Here is a new ironing machine, or new flat iron." It might be a new style toaster or percolator or some other small appliance.

Why do I say he should bring her over to show her something new? For the simple reason that everybody knows that women are always interested in new equipment. Women are far ahead of men in that respect. They are always desirous of keeping themselves posted on the new things that are coming into the market and any time you tell a woman that you want to show her something new, I will guarantee that she will be perfectly willing to go look at it, provided she has a minute to spare. Try it and see if I am right.

That is salesmanship and all you need if you are an electrical salesman is to get the customer standing beside the article, get her interested in it, and know enough about it to convince her that you have the right article, and then if you don't sell it that day you have a chance to follow her up and maybe get her order a little later.

It is just as important to buy as it is to sell. If we couldn't buy merchandise we never would have anything to sell and if we are not going to be fair with our source of supply, how can we expect to be fair with the people who take our merchandise? And yet the man who keeps four or five machines there and tells the customer that one is better than the others is not fair to the others. He can't be fair to those other three or four people who are putting their merchandise into his store and trusting him to give them distribution, trusting him to be fair and honest, trusting him because they have confidence in him. It is impossible. You can't do it. You have either got to say to the customer, "This one is better than the rest," or else, "Lady, they are all about alike; take your pick." And when you do that you are putting yourself in the same position as a man who sells oranges and bananas out on the corner. There is no salesmanship; there is no merchandising ability there. There isn't anything there that we want in our electrical stores.

And Finally "Service"

As I go round the country I frequently hear electrical dealers make the statement, "Well, the manufacturers aren't fair to us fellows; they are selling to the department stores and hardware dealers and they sell to dry goods stores or drug stores or anybody else that will buy their stuff. Anybody can buy electrical stuff to-day."

And I say to them, "Well, what of it? Why shouldn't a manufacturer sell to these people?"—

"Listen, they don't know how to give service"—that is what they invariably say—"the hardware store, the depart-

ment store, the drug store and everybody else that sells electrical devices, except the electrical dealer, doesn't know how to give service."

Possibly it is true. I don't say that it isn't; I don't say it is. I don't say it has any bearing on the matter one way or the other, but I do say that the electrical dealer who shouts all the time from one end of the year to the other that nobody but the electrical dealers should be allowed to sell electrical appliances is not giving the service he should give and in hundreds of cases he doesn't even understand the meaning of service. He looks at the cost only instead of what it means to him in building up good will, holding his customers and increasing his business.

Real Help for the Customer—and the Sequel in Profits

Let me show you a little instance. Here is a woman over here in the midst of her ironing on Tuesday morning. At ten o'clock something goes wrong with the flatiron. It won't heat. She is in a terrible fix; she is in a big hurry to get through with the ironing because she has a lot of other things to do. So she 'phones to the dealer who sold the flatiron to her. And she tells him her troubles. He says, "Don't let it bother you, Mrs. Brown I will send somebody out there to take care of it for you." In few minutes the man appears, the iron is fixed and the lady goes on with her work, happy and contented.

Now, you have heard of "back-door advertising" and "over the fence advertising." This John Smith, the dealer who sold the flatiron then gets some of that "back-door advertising" that no money could buy when this lady leans across the fence and tells her neighbor next door what a wonderful fellow John Smith is, how he helped her out of her trouble and how grateful she is to him. And then she leans over the other fence and tells the same story to the neighbor on the other side. And in the afternoon she goes to her card club and all the ladies are told the virtues and glories of John Smith who saw that she got service when she needed it. And later she goes to her church social and again she tells the people what a great fellow John Smith is to deal with. And what does it mean to John Smith? It means that in the minds of these people is being put this thought: "That is the kind of a man with whom I would like to do business."

Niagara Peninsula Organization Complete

The Electrical Contractor-Dealers of the Niagara Peninsula held their first real organization meeting on the evening of October 10 at Mr. W. P. Dixon's restaurant, Niagara Falls, Ontario. After an informal dinner the objects of the association were outlined for the benefit of prospective members, several contractors agreeing to file application forms; a few important matters relating to the trade in general received free and frank discussion. The following officers were unanimously elected:—President, J. H. Sandham of the J. H. Sandham Co., St. Catharines; Secretary, William Mackenzie of the Sterling Electrical Co., St. Catharines; Treasurer, W. P. Dixon, of the Central Electric Co., Niagara Falls; Executive Officers, Fred Sage, of the F. Sage Co., Welland; and William Simpson, of the W. Simpson Co., Niagara Falls.

The organization was named the Niagara Peninsula Branch of the Ontario Association of Electrical Contractors and Dealers, which is affiliated with the National Electrical Contractors Association of the United States, an organization that has done good work in unifying and crystalizing business-like methods in the electrical profession.

Members present expressed appreciation of the tireless and unselfish work of Mr. V. K. Stalford, consulting engineer, of Hamilton; also Mr. K. A. McIntyre of Toronto,

both of whom have assisted the local branch to get busy and "Put the Electrical Idea Over". It was unanimously agreed that the regular district meetings should be held twice a month on the first Monday and third Wednesday of each month, meeting alternately at St. Catharines, Welland and Niagara Falls with special meetings at Port Colborne.

With a splendid spirit of co-operation and goodfellowship, The Niagara Peninsula Branch promises to be one of the liveliest and best in the Province of Ontario.

New Officers for Hamilton

The Hamilton District of the Ontario Association of Electrical Contractors & Dealers held a meeting in the Royal Connaught Hotel on Monday, October 17th. There was a large turnout of members and their friends. The election of permanent officers was conducted by Mr. K. A. McIntyre, chairman of the Ontario Executive Committee.

Mr. J. Culley, Mr. W. G. Jack and Mr. J. A. Dynes were elected executive committee-men. Mr. W. G. Jack was elected to represent the association on the Ontario Executive Committee. The Finance Committee of the Electrical Development Campaign reported very fine progress and gave the assurance that the finances would be forth-coming. Further inquiries are to be made before the Association will finally decide on this matter.

The Publicity Committee made a report on the Publicity Campaign. The result of their work was the inauguration of electrical pages weekly in the daily press.

Mr. Richard Farr of the Arcade, Limited, was appointed permanent Publicity Agent for the association.

Mr. K. A. McIntyre addressed the meeting on the work of the Society for Electrical Development. The Executive Committee requested the assistance of Mr. Geo. House, Mr. W. A. Stevenson and Mr. V. K. Stalford in making up a report on the Licensing Act, which is to be submitted at the next meeting of the association.

Illuminating Engineers Active

The first meeting of the Toronto Chapter of the Illuminating Engineering Society was held in the Engineers Club, 96 King St. West, Toronto, on Monday evening, October 17. The chairman of the Toronto Chapter, Mr. G. G. Cousins, addressed the meeting on the subject of Automobile Headlights. The second meeting will be held on October 28, which will be a joint meeting of the Toronto Branch of the A. I. E. E. This meeting is being held in room 22 in the C. & M. Building, University of Toronto, and the speaker will be Mr. Brownlee, superintendent of the Canadian Sunbeam Lamp Works. A third meeting has been arranged for November 21 and a fourth for January 16. Other meetings may be interspersed, of which announcement will be made later.

It is the intention of the executive to select subjects that will prove educative as well as interesting. To this end, addresses will cover such topics as Illumination and Architecture; Characteristics of Lighting Glassware; Characteristics of Different Types of Electric Lamps, etc. Members are again advised that they are at liberty to bring any friends who are interested in better illumination.

The Toronto secretary is Mr. W. H. Woods, 507 Brunswick Avenue, Toronto. Mr. Woods is always ready to answer inquiries regarding the Society.

The lamps for the lighting installation along Sunnyside Boulevard, Toronto West, described in a recent issue of the Electrical News, are being supplied by the Canadian Laco Lamps, Ltd.

Who Should Sell Isolated Plants?

Why is it that we hear it said so often that neither the electrical contractor nor the electrical dealer is a suitable medium through which to market isolated plants? Why is it that this business, which is growing by leaps and bounds, is being handled by automobile liveries, farm machinery agencies and such like?

The answer must be one of two things--either the business is unprofitable or the electrical man is asleep at the switch. We don't think it is the first of these. True, it may be that the isolated plant doesn't sell at sight, and the man living in an isolated district may be of a type that is a little harder to handle than the town and city man who has formed the habit of spending all his money on the things that appeal to him most at the moment; but here is exactly where the difference comes in between the "order taker" and the "salesman." The "order taker" merely wraps up the parcel that his customer asks for; the "salesman" creates the desire on the part of the customer so that he will ask for the parcel.

The further question arises, then, as to whether an electrical man, the man who knows and appreciates the value of electric light and electrical appliances, is in a better position to create a desire for these things than is the automobile man or the farm machinery man. The answer surely is plain: the first knows all about the subject and the other knows nothing about it; the first is in sympathy, the other is not.

In spite of these things, isolated plants in considerable numbers are being sold by men who are not connected with the electrical business in any way. They find it profitable or they wouldn't continue to do it.

The only reasonable conclusion when all these things are taken into consideration is, therefore, that the electrical contractor and dealer is not awake to the possibilities of the isolated plant field. He doesn't seem to realize that the sale of such a plant not only includes the profit on the plant itself, but that it also means a profit on the wiring of the home and out-buildings; a profit on the lamps and a profit on numerous and various appliances. These items, taken all together, may well run into \$1,000. or \$1500., the profit on which is well worth a fair amount of pioneering.

The time of year is on us when the occupants of the isolated home spend many hours in the company of the dismal coal oil lamp. What more interesting or profitable occupation for the electrical contractor-dealer than to spend an occasional evening in a country home delighting and educating the members of the household in the wonders of electricity, supplied from an isolated plant located in his little Ford truck just outside the door.

The Value of the Electrical Page

The idea of an Electric Page in the newspapers of the larger centres seems to be taking hold. The city of Hamilton started things off with a bang on October 8 by running two pages in each of its two dailies. The industry in that city is to be congratulated on the appearance of these pages--their general make-up and the snappy, interesting advertisements. For a start, it may be said to be a really wonderful effort.

The difficulty in the preparation of all such pages lies in the preparation of the reading matter rather than the advertisements. Each firm is more or less fitted to tell the public about its own equipment, but it requires some individual or committee that can disassociate itself from the specific products to be advertised in such pages and deal, in a general way, with the advantages of electrical devices. The public must be told in an interesting, conversational, story-like way about the wonders of electric power. The plain facts, that labor-saving devices are available for the home,

doesn't catch the fancy of the public so well as the story of what these devices are doing daily in thousands of homes equipped with them--how they will solve the servant problem; do away with the drudgery of washing, ironing, cleaning and other household daily duties; provide comfort and periods of leisure undreamed of to-day by the woman who keeps house in the old-fashioned way.

The Hamilton pages were splendidly supported by the industry in that city, prominent advertisements being inserted by the Canadian Westinghouse Company; Hoover Suction Sweeper Company; V. K. Stalford, consulting engineer; Hunter & Strome, electric heating specialists; Popular Priced Electricians, contractor-dealers; Jack Brothers, contractor-dealers; John A. Dynes & Company, electrical contractors and engineers; Toronto & Hamilton Electric Company; Gas & Electric Appliance Exchange; Chadwick-Carroll Brass Company; Snyder Bros., contractor-dealers; Fred Thornton, contractor-dealer; Crawford Electric, contractor-dealers; The Arcade, Ltd., contractor-dealers; Tallman Brass & Metal Ltd.; The Hydro Shop and the Pottier Electric Company. Such co-operation as this sets a fine example to other Canadian cities.

Electric Club of Toronto

On October 12 the Electric Club of Toronto had one of the largest meetings in its history. Mr. G. E. Long, K.C., lecturer at the Ontario Law School, gave a most interesting address on the subject "The Layman and the Lawyer," reviewing the development of the profession of law from the time of Moses down to the present day. The address, naturally, included many humorous anecdotes.

The meeting of October 19 also provided a delightful hour for the members. Mr. Bertram Forsythe addressed the Club on "Some Theatrical Anecdotes." Mr. Forsythe is a graduate of Oxford University and has just recently arrived in Canada to become director of the Hart House theatre, Toronto University. He is enthusiastically hopeful of creating a much keener interest in the drama. At the end of his address, by special request, he outlined the dramatic program that is to be presented at Hart House during the coming winter. He stated that there was much splendid material available in the University for dramatic work, and while many of the plays this year would be of foreign composition, he expected that by next year much work of purely Canadian authorship would be available for presentation.

New Catalogues

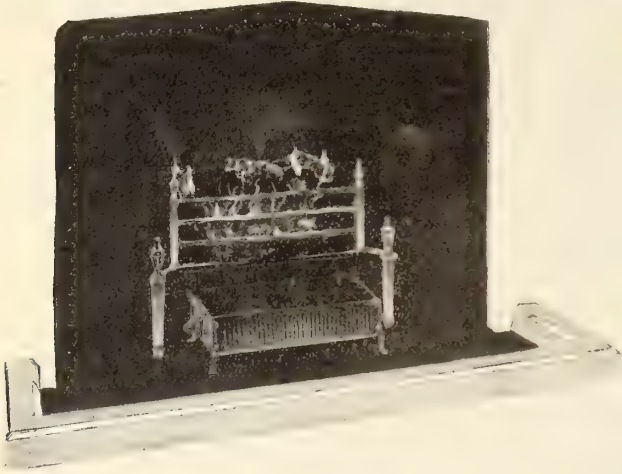
The Jefferson Glass Company, Toronto, are distributing a supplement to their catalogues Nos. 4, 5, and 6 illustrating lighting units and shades which have been marketed since the completion of these earlier catalogues. Special interest attaches to their announcement of a new commercial lighting glass--"Sol-lux"--a highly efficient product which has just been perfected. "Sol-lux" conceals the source of light, even with high candle power nitrogen lamps, at the same time distributing very efficiently. The co-efficient of absorption is also claimed to be very low. The company are now in a position to supply all their commercial pieces in "Sol-lux" glass.

Gillis & Geoghegan, Sherbrooke, Quebec, have just issued a new 20 page, 8½ x 11 inch two-color catalog. It is fully illustrated with photographs of actual installations of G & G Telescopic Hoists, as used for handling ash cans, barrels, trays and other loads. It also contains two forms of specification for each model, one a very short form and another which describes the various parts of a complete Telescopic Hoist installation. Any one interested may obtain a copy by writing the firm.

Looks Like a Real Fire

The newest thing in electric heating devices is what is known as the Magicoal Electric Fire, manufactured by the Magicoal Electric Fires (Canada) Limited, 102 St. Antoine St., Montreal. The company also have a western agent, Touchbuttons, Limited, in the B. O. T. building, Winnipeg.

This product is the nearest approach to a coal fire that has yet been produced. It may be used with very small current consumption to give a very excellent reproduction of the flame and combustion effects of a hot coal fire, or if required, this may be accompanied by the development of



sufficient heat to warm the room. This product has been on the market only a short time but has created very favorable comment. It is an English invention, but we understand it is being manufactured for the Canadian market in Canada.

The illustration herewith gives a very good idea of the appearance obtainable, though the color of course is lacking. A feature well worth considering is the fact that it is adaptable to existing grates and baskets; also where rooms are not fitted with fire places there may be readily installed a mantle in a corner or other position into which the Magicoal may be fitted—no flue being required.

Eugene F. Phillips Building in Brockville

The Eugene F. Phillips Electrical Works, Ltd., of Montreal, has just entered into an agreement with the civic officials of Brockville, Ont., whereby the company will receive a grant of 132 acres of land adjoining the town on which to locate their main plant. The site is to be taken into the town corporation and water service, etc. installed.

When the necessary bylaw for the purchase of the land, etc. has been passed by the ratepayers, and final arrangements completed, the company will make preparations for the erection of its first unit—a large rolling mill—which, it is understood, is to be in operation within eight months.

The new plant will cost in the neighborhood of \$3,000,000, and when running at full capacity will give employment to some 600 men, with an estimated annual payroll of \$500,000.

A fixed assessment of \$20,000 on buildings and lands for a period of ten years is granted to the company, and the appointment of a town planning commission is also provided for, to insure the beautification of the grounds.

Mr. E. W. Tobin, electrical contractor-dealer of Stratford, Ont., is closing out his business to become manager of a hydro store. The local Hydro Commission has purchased a building and is having it remodelled with a view to opening up for business about December 1st.

Externally Operated Switches

The Langley Electrical Manufacturing Co., Winnipeg, Man., are showing a nice line of externally operated switches. For the past ten years this company's factory has been turning out steel cabinets and cutout boxes for the electrical trade and should, therefore, be in an excellent position to fill the demand.

How to Judge a Cleaner

The Hoover Suction Sweeper Company are distributing a very attractive little booklet, entitled "How to Judge an Electric Cleaner." The illustrations in this booklet are unusually artistic. A quantity of valuable information classifies the advantages of the modern electric sweeper over the old way; the savings, both in money and energy are also outlined in a most readable manner. Arguments are summed up in the conclusion that "The Hoover costs less to have than not to have."

Municipal Plant for Vancouver (?)

Development of a municipal hydro-electric plant and system has been taken up by the aldermen of Vancouver, a special committee having been appointed to collect information and report. Some of the council, while willing to look into cost, and also favoring any method of reducing rates in order to induce industrial development, were averse to any proposition demanding large capital expenditure.

A Good Selling Suggestion

In the window of a Birmingham (Eng.) stationer is a large clock, and underneath is the notice:—

WATCH THE CLOCK.

A NEW BARGAIN EVERY HOUR

A new article is placed in the window every hour at a specially reduced price. Everybody stops to look at the clock, and good business is said to result. Enterprise well worth imitating!

Mr. H. C. Powell, of the Toronto Hydro-electric System, recently gave an address before the Electric Club of the Central Technical School, Toronto, on the subject "Does it Pay to be an Electrician?"

Through the agency of Messrs. Ridout & Maybee, patent solicitors, Toronto, Moffat's, Limited, have taken out a patent on an electric water heater, and the National Electro Products, Ltd., a patent on electrolytic apparatus.

The Sangamo Electric Company, Springfield, Ill., are distributing Bulletin No. 57, superseding Bulletin No. 49. This bulletin is given over to a description of switchboard meters of the alternating current, single phase and polyphase type; direct current, 2-wire and 3-wire; also all types of ampere-hour meters. The illustrations not only display construction features of the meters but also include connection diagrams.

The Canadian Comstock Company has been awarded the electrical contract for the Herald Press Building and for the warehouse and office building for the Quebec Liquor Commission, both of Montreal. The architects in the former case are MacVicar & Heriot, and in the latter John S. Archibald and J. O. Turgeon. The consulting engineer on the Herald Press Building is W. H. Wardell and on the Commission's building McDougall, Pease & Friedman.



Electric Railways

Aims and Activities of the Canadian Electric Railway Association

Mr. G. Gordon Gale, president of the Canadian Electric Railway Association, recently issued a statement regarding the aims and activities of that organization. It will be recalled that at the last annual meeting, it was definitely decided that this should be an association including all the railway systems of Canada, whether municipally or privately owned or operated. During the months that have intervened the executive have endeavored to interest the various municipal railway systems. At the present time we understand that plans are under consideration whereby the membership fee shall be based upon the gross earnings of each system. This is a move in the right direction, as it will make it more easily possible for the smaller systems to have representation. In other organizations, such as for example in the Electrical Contractors Association and the Canadian Electrical Association, this arrangement of fees according to gross earnings has worked out very satisfactorily.

The work accomplished by the Canadian Electric Railway Association in the past has doubtless been much more valuable than has generally been appreciated. For many years it was a close corporation—a mistaken idea, undoubtedly, but one that has now been remedied. What is needed at the moment is the support of every electric railway in Canada. The exchange of information and experiences that has proved so valuable in other lines of electrical endeavour would be no less so to electric railway officials. In this connection Mr. Gale's announcement is of very great interest. It runs as follows:

During the past few years the Canadian Electric Railway Association has progressed and advanced to a degree that is gratifying to its members. The association is handicapped to some extent by the great distances separating member companies from each other and it is, therefore, by mail, that the most important service is rendered by the association to its members. Meetings are held annually at which papers are read and addresses are made on current topics. The meetings afford a suitable occasion for intimate discussion and this gives members the opportunity of getting together and getting acquainted. In addition the informal discussions which take place on these occasions and the valuable interchange of views together with the good fellowship and mutual understanding which is developed are advantages which can hardly be over-estimated.

Information over a wide range of subjects has been gathered and sent out to those interested, giving each member the benefit of the experiences of his fellow members. In this connection it is apparent that the campaign which the railway companies have carried on to educate the public, has reacted upon themselves, in developing a broader and more helpful policy towards one another.

It is really pleasing and gratifying to note the trouble and expense members will incur to procure the data requested by another member. Confidential information has been given out without hesitation, and I am satisfied that this policy is building up a spirit of co-operation among

the members which must ultimately result in raising the standard of electric railway operation in Canada. It is so much easier to imitate or improve upon an article or method than it is to originate or create, and the readiness with which a good thing is handed on to a needy member is refreshing.

The Association has always been interested in legislation affecting its members, and the organization has been of considerable use to the members in this respect.

Other activities of less importance have been undertaken by the Association from time to time, but care has been taken to avoid duplication of the splendid work which is being carried on by other Associations.

The Winnipeg Electrolysis Situation

It will be recalled that an article on the Mitigation of Electrolysis in Winnipeg by the 3-wire system was published last spring in the Electric Railway Journal, of New York, and the Electrical News, of Toronto. The system has since been completed, and has continued to be entirely satisfactory to the Winnipeg Electric Railway Company from all points of view, as an operating proposition.

In order to determine whether the railway company's contract with the city had been fulfilled, it was agreed that an examination by outside experts should be made of the system and its operating results in the reduction of track potentials and the stray currents resulting or assumed to result therefrom. The engineering services of Albert F. Ganz, Inc., were therefore retained jointly by the city, the telephone and the railway interests; after they had been supplied with a quantity of advance information, the installation was examined early in October by Professor L. A. Hazeltine and Mr. C. F. Meyerherm of the above organization.

Visits were made to the railway sub-stations, and a complete set of recently taken track potential charts covering the entire system showed the operating results secured. After the experts had had separate conferences with the various interests concerned, a joint conference was held on October 4th, at which were present the legal and engineering representatives of the three parties.

It was readily agreed that the system of mitigation employed should be judged by its results; and Professor Hazeltine then reported that he had come to the conclusion that the safe and proper course for the city to pursue, before the system installed was finally accepted as being a proper remedy for mitigation of electrolysis, would be to give it at least six months' test, and that in the meantime the company keep a careful record of all the readings of the various voltmeters, and furnish the city as well as himself with copies of these reports from time to time; and that after studying these records and noting the results shown thereby, he and Mr. Meyerherm return here in the spring for the purpose of conducting a detailed investigation into the system.

Prof. Hazeltine further stated that so far as the readings shown on the records which he then had before him indicated, the system was working satisfactorily and had produced the results contemplated by the Electrolysis Act as

well as by the Ganz report of 1914-15. The principal remaining requirement is to have assurance that these results would be continuously permanent.

The representatives of the railway company promptly agreed to furnish the charts and operating logs desired. The final field survey, which will probably require a month's time, will be made in the spring of 1922, and in connection with the showing in continuity of performance developed in the meantime, should settle this matter permanently.

An Improved Trackless Trolley Bus

Through the combined efforts of the Detroit City Railway Commission, the Packard Motor Car Company and the Westinghouse Electric & Manufacturing Company, another interesting contribution has been made to the study of passenger bus operation. This new development is an improved, electrically driven, trackless trolley capable of hauling a minimum of thirty passengers and of attaining a speed of more than twenty-five miles an hour.

The bus is twenty-four feet long, eight feet wide and weighs 11,500 pounds, which is considerably less than even the small one-man street cars which are operating in various parts of the country. Current for driving the bus is furnished by a two-wire trolley circuit, through a two-pole trolley which permits marked freedom in turning to the right and left according to the demands of traffic. Complete turns are made with equal freedom and facility.

Simplicity of control and operation is highly perfected. The application of power and the braking are both accomplished by foot controls, thus leaving the operator's hands free for driving and for opening and closing the door. The bus is made to run at two speeds, the first about fifteen miles an hour and the second about twenty-five. The power can be varied quickly and positively through the use of the foot controls.

The results of the tests, in so far as they will influence the actual placing of orders for bus equipment of this type, have not yet been commented upon definitely by Detroit city officials. Mayor Couzens, however, has said: "I do not wish to appear definitely committed to this type of car, but from what I have seen, I believe it can be used very successfully in conjunction with our municipal lines, and, with time, developed to give adequate service in the downtown districts."

As a mechanical unit, the new trolley is an ingenious combination of a Packard truck chassis with an electrically driven power plant. The motive power is furnished by two 25 h.p. 37 ampere, 600-volt motors, mounted in tandem by means of a universal joint, and connected by means of a second universal joint to the standard-type truck, differential drive in the rear axle. The motors are of the standard safety-car type, with their shafts extended at both ends so that the universal joints may be readily attached. Both of the motors are interchangeable and are protected against thrust from the driving mechanism.

Collection of the current is effected by the use of two No. 13 U. S. trolley bases, fitted with 18-foot poles, swivel harps and 6-inch wheels. The harps are provided with eyes on the swivel studs so that a light pole with a hook in the end can be used to turn the wheel and manipulate the trolley.

The bus body is constructed in accordance with the best practices prevailing in the car building industry. It is of single-deck type, and is equipped with special springs, exhaust heaters, ventilators, electric lights, push buttons and illuminated route signs.

The contract for the electric pumping station to be erected at Point St. Charles, Montreal, has been awarded to the Atlas Construction Co., Ltd., 37 Belmont St., Montreal.

The Ottawa Electric Railway Company

The Ottawa Electric Railway Co. are adding a transformer room and an additional motor generator set to their Nelson Street boosting sub-station. This unit consists of a Westinghouse 2200 v., 60 cycle, 2-phase induction motor directly connected to a Westinghouse d.c. 600 v. compound wound generator. The power to operate this set will be transmitted from the Slater St. sub-station in an underground conduit line at 11000 volts, to the primary end of 2-1100 kv.a Westinghouse, oil insulated, water cooled transformers, 11000 v. primary, 2200 v. secondary. The cable to be installed is a four-copper conductor No. 2/0 B & S 12000 v. paper insulated, lead covered cable. The transformers are equipped with corrugated iron tanks and are self cooled for normal load, water being supplied from the city mains during sustained peak loads. This set will be capable of supplying about 1500 kw. to the company's 600 v., d.c. feeders during the peak load hours. It is expected that the plant will be in operation in about six weeks time.

Car Rides Cheap in Vancouver

Twenty-one cities in Canada have higher fares than Vancouver, and five others have equal fares. Here they are:

Ten-cent fares: Regina, Calgary, Saskatoon, Sherbrooke, Sydney, N. S., North Cobalt, Levis, St. John—8.

Seven-cent fares: Montreal, Toronto, Winnipeg, Edmonton, Fort William, Port Arthur, Brandon, Peterboro, Quebec, Halifax, Guelph, Haileybury, New Glasgow—13.

Six-cent fares: Sarnia, Moosejaw, Vancouver, Victoria, New Westminster, North Vancouver—6.

A bare half-dozen cities in the whole of Canada have lower fares than B. C. Electric cities, and many of these are in difficulties.—B. C. Buzzer.

St. John Strike Situation

The New Brunswick Light, Heat & Power Company, which operates the street railway system in St. John, N. B., have had a strike of employees for some time, which they met by employing non-union help. Recently the cars were mobbed and rocks and missiles thrown through the windows, by, it is claimed, members of labor organizations who were on a labor parade. Summonses were immediately issued for the appearance of a number of the officials of the trades and labor council to answer a charge of unlawful assembly.

One-man Safety Cars in Vancouver

The British Columbia Electric Railway Company are planning to give One-man Safety Cars a try-out. The usual opposition is developing, but in view of the success of these cars in other cities it should be possible to convince the citizens that these cars have special advantages if operated under favorable conditions. Cities of all sizes in Canada and the United States are to-day finding the Safety Car satisfactory alike to the citizens who use them and the management that operates them.

It is reported that a bus service has been inaugurated in Niagara Falls, Ont., giving a fifteen minute service between Bridge Street and Falls View. These buses operate on the street railway route.

The Hull Electric Company, of Hull, Que., who have been operating one safety car for some months, have found this type of car very satisfactory for their lines and have placed an order for five more of similar design.

Current News and Notes

Calgary, Alta.

The annual report of Calgary Power for the year ended Dec. 30, 1920, shows a net profit of \$58,358., as against \$89,729. for the previous year. This difference is largely due to the fact that the bonded indebtedness is payable in New York, with the adverse exchange rates incident thereto.

Edmonton, Alta.

Mr. Colin Allan, 9948 Jasper Ave., Edmonton, Alta., has been awarded the contract for electrical work on a store building being erected at 10218—101st St., for Mr. Cristell, Royal George Hotel, Edmonton.

Hamilton, Ont.

Mr. Frank Malloy, an experienced electrician, has started in business for himself as electrical contractor and dealer, and has opened a new store at 462 St. James St. N., Hamilton, Ont.

Mr. T. Murphy, 241 Robert St., Hamilton, Ont., has secured the contract for electrical work on a building being altered for a school by the Separate School Board at an approximate cost of \$55,000.

Kitchener, Ont.

Messrs. Ellis & Howard, Kitchener, Ont., have been awarded the contract for electrical work on a business block being erected at 26 Benton St., Kitchener, for Mr. P. Eby. Also, on a rendering plant to be erected on Courtland St. E., Kitchener, for J. M. Schneider & Sons.

Lachine, Que.

The Northern Electric Company, Ltd., 121 Shearer St., Montreal, have been awarded the contract for repairs to the lighting and alarm systems of the town of Lachine, Que.

Marmora, Ont.

The power house of the Pearce Lumber Company, Marmora, Ont., which generated power for the company's saw mill and other plants was destroyed by fire recently.

Milltown, N. B.

Mr. H. D. Blaney, Milltown, N. B., has been awarded the contract for electric wiring on a school being erected in that place at a cost of \$90,000.

Mimico, Ont.

Messrs. Warner & Fordyce, Mimico Beach, Ont., have been awarded the electrical contract on two stores to be erected in the near future on Church Street, Mimico, Ont., for Mr. W. G. Watson.

Moncton, N. B.

Messrs. White & Arsenaault, electricians, Main St., Moncton, N. B., suffered a fire loss recently.

Messrs. Perry Bros., 773 Main St., Moncton, N. B., have been awarded the contract for electrical work on the Knights of Pythias Hall recently erected at Gordon and Bonnacord Sts., Moncton, at a cost of \$75,000.

Montreal, Que.

The Uptown Electric Company, 926C St. Catherine St. W., Montreal, has secured the contract for electrical work on two stores being erected at Sherbrooke St. and Hampton Ave., Montreal, for F. Dansereau, 216 Hampton Avenue.

The Southern Canada Power Company, including its subsidiaries, showed an increase in net earnings of \$7,437. for the month of August and a \$59,002. increase for the eleven

months ended August 31, 1921, as compared with last year.

Mr. H. Byron, 226 Durocher St., Montreal, has been awarded the contract for electrical work on the bank building at St. Denis and St. Catherine Sts., owned by the Royal Bank of Canada, which is undergoing alterations.

The Acme Electric Co., Herald Building, Montreal, has been awarded the contract for electrical work on a \$50,000 garage being erected for Mr. J. R. McCaig, 677 St. Paul St. W., Montreal.

The Board of Arbitration, asked for some time ago by the employees of the Montreal Tramways Company, because of a 12½ per cent reduction in wages, has reported in the company's favor, stating that in view of changed conditions the action was warranted.

The Union Electric Supply Company, wholesale jobbers, 138 Craig St. W., Montreal, has taken over the premises previously occupied by the Victoria Electric Supply Company. Mr. S. Rutenberg, who for the past eight years has been in the electrical supply game, is general manager. This firm is now installing an up-to-date fixture department, which will be completed in the immediate future.

The Western Quebec Power Company, Montreal, state that they are planning to start construction work in the near future on 12,500 volt transmission lines and sub-stations costing in the neighborhood of \$70,000, the work being financed by the municipalities affected.

The Canadian Comstock Company, Ltd., 10 Cathcart St., Montreal, has secured the electrical contract on the two million dollar office building being erected at Montreal for the Canada Cement Company.

Mr. Thos. O'Connell, 183 Ottawa St., Montreal, has secured the contract for electrical work on a \$250,000. apartment house being erected at Sherbrooke and Mount Pleasant Ave., Montreal, for the Westmount Industrial Corporation, Limited.

Moose Jaw, Sask.

The Acme Electric Co., Moose Jaw, Sask., has secured the contract for electrical work on a Tea Room building being erected in that city for the Temple Gardens, Ltd., at an approximate cost of \$25,000.

Peace River, Alta.

The town council of Peace River, Alta., are contemplating the installation of an electric lighting plant and are open to negotiate with a reliable company for such. Letters should be addressed W. J. Doherty, Peace River, Alta.

Quebec, Que.

Mr. Fortunat Gingras, 34 St. Augustin St., Montreal, Que., has been awarded the contract for electrical work on an addition being built to La Banque Nationale building, St. Peter St., Quebec City, Que. at an approximate cost of \$350,000.

South Vancouver, B. C.

Messrs. Mundy, Rowland & Co., 510 Hastings St. W., Vancouver, B. C., have been awarded the contract for electrical work on the McBride School addition, South Vancouver.

Three Rivers, Que.

Mr. J. B. Badeaux, St. Maurice St., Three Rivers, Que., has secured the electrical contract on a \$75,000 convent recently erected at St. Charles & Laviolette Sts., Three Rivers.

St. Lambert, Que.

Mr. C. E. McGregor, 55 Mercil Ave., St. Lambert, Que., has been awarded the contract for electrical work on nine residences to be erected on Oak Avenue, for Modern Housing, Ltd., 638 Notre Dame St., Lambert, Que.

Mr. Fred Matthews, 52 Elm Avenue, St. Lambert, Que., has the contract for electrical work on eight residences to be erected on Alexandra Avenue, St. Lambert, for the South Shore Housing Company, Cartier Building, Montreal.

Three Rivers, Que.

Mr. Roland Gailloux, 95 Des Forges St., Three Rivers, Que., has been awarded the electrical contract on an apartment building recently erected at 205-207 Denoue St., Three Rivers, for Mr. Paul Rivard.

St. John, N. B.

The New Brunswick Electric Power Commission, St. John, N. B., have awarded the contract for the erection of steel towers for the Musquash River-St. John transmission line to the Canadian Bridge Company, Walkerville, Ont.

Toronto, Ont.

Jas Devonshire, Limited, 659 Yonge St., has secured the contract for electrical wiring on an artificial ice skating rink and club house being erected on Dupont St, near Bathurst, at an estimated cost of \$55,000.

The Toronto Electric Co., 101 Duke St., Toronto, has been awarded the contract for electrical work on the \$235,000. addition being built to the car barns at Danforth & Coxwell Avenues.

The Patterson Electric Co., 43 Fermanagh Ave., Toronto, have been awarded the contract for electrical work on an addition being built to the Wychwood & Benton Ave. car barns at an estimated cost of \$220,000.

The Ohio Tuec Vacuum Cleaner Company, Ltd., has changed its name to that of "The United Electric Company of Canada, Ltd.," as announced in a recent issue of the Canada, Gazette.

Messrs. Harris & Marson, 81A Parkway Ave., Toronto, have secured the contract for electrical work on the Pure Food Exhibits Building to be erected in Exhibition Park.

About 100 new street cars, out of a total of 250 ordered by the Transportation Commission, have been received to date; these are being put in operation on the lines being prepared for the wide cars.

The incorporation of the Bluebird Sales, Limited, with a capital of \$40,000., to manufacture and deal in electrical goods is announced in the Ontario Gazette. The head office of the company will be at Toronto.

The Mechanical Trades Co., 54 University Ave., have secured the contract for the electrical wiring on the new Monarch Park school which will be erected at an estimated cost of \$100,000.

Messrs. Richardson & Cross, 79 King St. E., have been awarded the contract for electrical work on a new school to be erected on Bridge st., Weston, at an estimated cost of \$75,000.

Messrs. Cavers & Harvey, 702 Brock Ave., have been awarded the contract for electrical work on three store buildings recently erected at St. Clair & Nairn Sts. for Mr. M. L. Coldoff, 415 Markham St.

Tranquille, B. C.

Messrs. Mundy, Rowland & Co., Standard Bank Bldg., Vancouver, B. C., have been awarded the electrical contract on a \$30,000. Nurse's Home to be erected at Tranquille, B. C.

Vancouver, B. C.

The B. C. Telephone Company, Vancouver, B. C., are building an addition to their Fairmont Exchange, 10th Ave.

& Prince Edward St., Vancouver, costing approximately \$30,000.

Mr. C. C. Carter, 739 Hastings St. W., Vancouver, B. C., has secured the contract for the complete overhaul, and necessary renewals, of the electrical equipment of the lighting plant, dynamos and engine of the C.G.M.M. Steamer "Canadian Importer."

Westmount, Que.

Messrs. J. A. Anderson & Co., 205 Mansfield St., Montreal, have been awarded the contract for electrical work on King's School, Western Avenue, Westmount, Que., which is undergoing repairs at an approximate cost of \$30,000.

Winnipeg, Man.

The Manger Electric Co., 7 Vingold Apts., Winnipeg, have secured the electrical contract for a rink being erected on Minto Street for the Thistle Curling Club of Winnipeg.

The Schumacher-Gray Co., Ltd., 187 Portage Ave. E., Winnipeg, Man., has been awarded the electrical contract on a \$95,000. addition being built to the Annabella Street warehouse of the J. D. Watkins Company, Winnipeg.

The Star Electric Co., 185 Lombard Ave., have been awarded the contract for the electrical work on the Childs Company's restaurant, McArthur Building, undergoing alterations at an approximate cost of \$125,000.

Windsor, Ont.

The McNaughton-McKay Electric Co., Windsor, Ont., has secured the electrical contract on the Prince Edward Hotel being erected at Ouellette Ave. & Park St., Windsor, for the Border Cities Hotel Company at an estimated cost of \$1,000,000.

The Rock City Electric Co., Ouellette Avenue and Erie Street, have been awarded the contract for electrical work on a Masonic Temple to be erected at Windsor at an approximate cost of \$200,000.

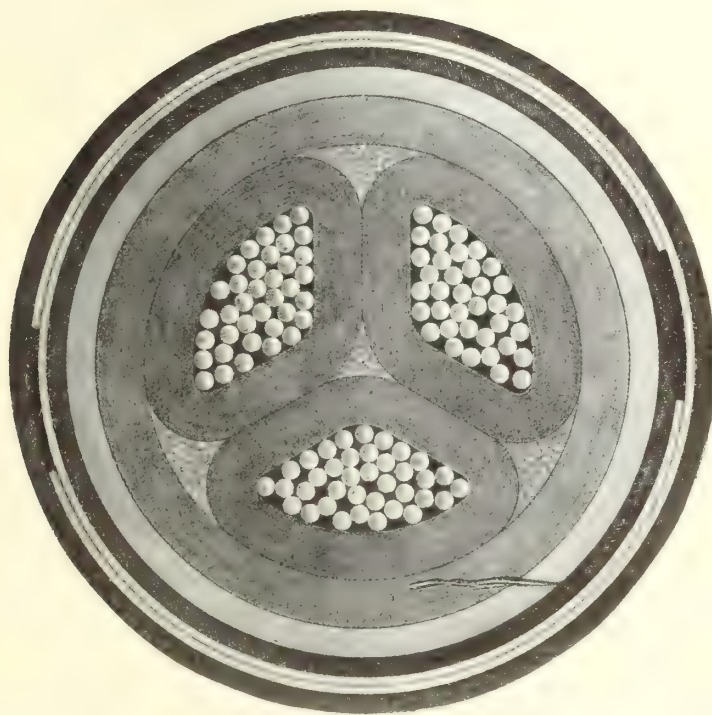
The Annual Financial Review

The Annual Financial Review, covering the financial features of Canadian corporations and other corporations in which Canadians are especially interested, for the year ending June 1921, has just been issued by Houston's Standard Publications, Toronto Stock Exchange Building, 84 Bay St., Toronto. This is a most valuable compilation of information concerning the earnings, assets and, in general, the stability of the various industries listed. In these days, when there are so many "wild cat" propositions presented in glowing terms to the unwary investor, it is well that there should be available a book of this nature, giving definite, complete and accurate information about our more reliable investments.

Whatever business a man may be in, if he is conservative and successful, he does not trust all his eggs in the one basket; in other words, he finds it a wise policy to invest a certain amount of his earnings in the securities of business propositions other than his own. This is the law of averaging, which, in the main, is the safest course. For this reason, every business man is interested in investments and it naturally follows that every business man should be also interested in this annual Financial Review.

The list of operations covered is very complete and includes the war loans; insurance companies; banks; guarantee companies; our industrials; land, loan, mortgage and savings companies; our industrials; land, loan, mortgage and savings steam railways; electric railways; trust companies; telegraph, telephone and cable companies and miscellaneous. This year the volume runs into almost 800 pages. The price is \$10.00—a small amount if it represents the difference between safe and hazardous investment of hard earned savings.

POWER CABLE



350,000 C. M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable

Overall Diameter—3.62 ins.

*Built to Specification of Hydro-Electric Power Commission
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Eugene F. Phillips Electrical Works, Limited
Montreal

*The Oldest and Largest Manufacturers of Bare and Insulated Wires and Cables
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POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 652, Electrical News, Toronto. 17-1f

Chief Electrician, age 35, technical education, 16 years practical experience industrial plant maintenance and construction. Location immaterial. P.Q. Box No. 6, Thetford Mines West, P.Q. 21-22.

An unusual money making opportunity is offered salesmen now calling on the electrical trade or industrial plants. It will cost you nothing to investigate. Address 824 Monadnock Block, Chicago. 21-22.

FOR SALE

Largest electrical and storage battery business in Northern Saskatchewan. Annual turn-over \$80,000.00

Apply 319, G. North,
Saskatoon, Sask.

Canadian Agency Wanted

A British firm expert in the manufacture of Compounds for Joint Boxes, Transformers, etc., requires agent to sell their products in Canada. Competitive prices assured with high quality. Apply Box No. 701 Electrical News, Toronto. 21.

TENDERS

Sealed tenders, addressed to Mr. A. Boulianne, Sec. Treas. Cap de la Madeleine, Que. and endorsed "Fire Alarm System," shall be received until five P.M. Monday the seventh day of November 1921 at the office of the town secretary, Cap de la Madeleine, for the installation of a complete fire alarm system. Any information, plan and specification can be obtained from the Secretary's office every day from 2 to 5 P.M.

Each tender shall be accompanied by an accepted cheque on a Canadian bank for ten per cent of the amount of the tender.

The tenderer shall engage himself to complete the works two months after the contract has been awarded.

The town council does not bind itself to accept the lowest or any tender.

Per order,

The Town Engineer,

ROMEO MORRISSETTE

Cap de la Madeleine, October 4th, 1921. 21.

Superintendent Wanted

for Hagersville Hydro Electric System.

Application giving references, experience, and salary expected, will be received by the undersigned up to November 10th, 1921.

J. T. Park, Secretary,

21 Hagersville, Ontario.

Urge Passage of Zoning Law to Stimulate Building

An early passage of the proposed zoning ordinance by the board of commissioners of Dallas, Texas, is being urged by the Metropolitan Development Association of the Chamber of Commerce in order to stimulate the building industry. A zoning ordinance has been under consideration for some time and many are reluctant to build until the various zones are definitely located. The city at present regulates the location of business and industrial buildings by requiring the con-

sent of three-fourths of the property owners living within a radius of 300 ft. of the centre of the proposed structure, but this ordinance is unsatisfactory.

NEW AND USED

MOTORS

In Stock for Immediate Delivery

100 h.p., 3 ph., 25 cyl., 550 volts, 710 r.p.m.
75 h.p., 3 ph., 25 cyl., 550 volts, 480 r.p.m.
60 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
52 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
50 h.p., 3 ph., 60 cyl., 550 volts, 970 r.p.m.
50 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
35 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
30 h.p., 3 ph., 60 cyl., 220 volts, 1150 r.p.m.
30 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
30 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
25 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
20 h.p., 3 ph., 25 cyl., 550 volts, 1420 r.p.m.
15 h.p., 3 ph., 25 cyl., 220 volts, 720 r.p.m.
15 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
15 h.p., 3 ph., 25 cyl., 550 volts, 1450 r.p.m.
13 h.p., 3 ph., 25 cyl., 550 volts, 700 r.p.m.
7½ h.p., 3 ph., 25 cyl., 220 volts, 1500 r.p.m.
7½ h.p., 3 ph., 25 cyl., 550 volts, 1450 r.p.m.
7½ h.p., 3 ph., 25 cyl., 550 volts, 725 r.p.m.
6½ h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
5 h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
5 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
3 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
3 h.p., 3 ph., 25 cyl., 550 volts, 1400 r.p.m.
2 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
2 h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
1½ h.p., 1 ph., 25 cyl., 110 volts, 1420 r.p.m.
1 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
1 h.p., 1 ph., 25 cyl., 110 volts, 1400 r.p.m.
1 h.p., 3 ph., 25 cyl., 220 volts, 710 r.p.m.
¾ h.p., 1 ph., 60 cyl., 110 volts, 1700 r.p.m.
¾ h.p., 1 ph., 25 cyl., 110 volts, 1450 r.p.m.
1-6 h.p., 1 ph., 60 cyl., 110 volts, 1150 r.p.m.

Machinery

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Ask for our complete stock list

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Can We Help You ?

There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

INFORMATION WANTED

Electrical News,
347 Adelaide St. West,
TORONTO.

Date.....19

Please tell me

.....

Name

Address

Street Cars For Sale

The Toronto Transportation Commission will receive tenders for the following 340 single-end city service street cars:—

<u>Group</u>	<u>Number</u>	<u>Description</u>
A	4	18' Single Truck Closed Motor Cars
B	2	20' " " " " "
C	15	21' " " " " "
D	117	22' " " " " "
E	30	23' " " Convertible Motor Cars
H	1	27' Double " " " "
J	1	30' " " " " "
K	12	25' " " Closed " "
L	34	30' " " " " "
Q	3	36' " " " " "
T	2	16' Single " Trailer "
U	33	19' " " Convertible " "
V	69	22' " " Closed " "
W	17	18' " " " " "

340

The single truck motor cars are mounted on Blackwell, Curtis and Peckham trucks and are equipped with G.E.67 and G.E.1000 motors, K-10 controllers and hand brakes. The trailers are mounted on special trailer gear.

The double truck motor cars are mounted on Curtis and Brill trucks and are equipped with G.E.80, G.E.67 and G.E.1000 motors, K-6 and K-10 controllers and Magann storage air brakes.

A stock of spare equipment is carried for the above cars and will be disposed of to parties purchasing the cars. The wheel gauge of the cars is 4 ft. 10 $\frac{1}{2}$ ins.

These cars are now in Toronto and can be inspected upon application to the Head Office of the Commission, Ryrie Building, Toronto, Ontario. Tenders will be based on the cars being loaded by the Commission on their siding in Toronto.

Tenders addressed to the Chairman, sealed and endorsed "Tenders for Street Cars" to be delivered at the Commission's Office, Room 219 Ryrie Building.

The highest or any tender will not necessarily be accepted.

Toronto Transportation Commission

229 Yonge St., Toronto, Ontario

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FOR POWER, LIGHT AND TELEPHONE WORK

Incandescent Lamp Cord, Flexible Switchboard Cables, Special Cords and Cables for all kinds of Electrical Work.

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They have proved their worth—they are business builders.

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Let CENTURY magneto

wall sets be your next choice. They can be

relied upon to give continuous uninterrupted

satisfaction.

Write for Bulletin No. 600-C—it describes both wood and steel equipment.

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(Incorporated)

Bridgeburg - Ont.

No. 65

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Longer Life and Hotter Spark Found in Other Batteries

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Every battery bearing the North Star label is guaranteed to give full satisfaction to the consumer.

Should the battery prove defective, simply satisfy the merchant from whom purchased. He is authorized to replace it.

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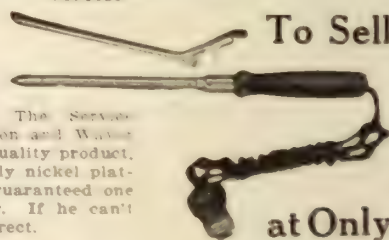
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"Service"

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A wonderful value! The Service Combination Curling Iron and Wave Rod is strictly high quality product. 11½ in. over all, heavily nickel plated. Heating element guaranteed one year. Ask your jobber. If he can't supply you, write us direct.

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HIGH GRADE BRUSHES

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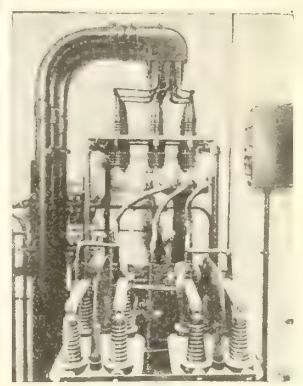
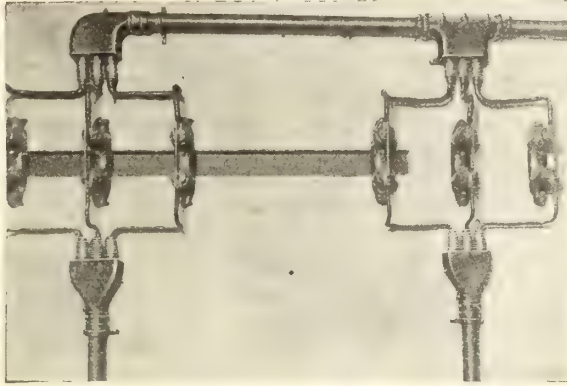
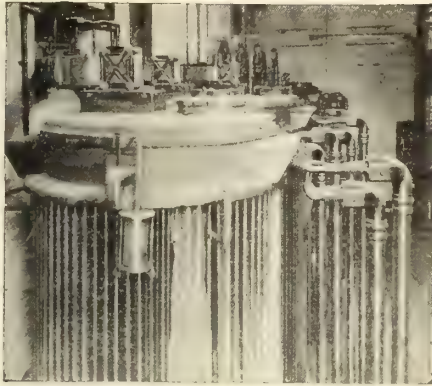
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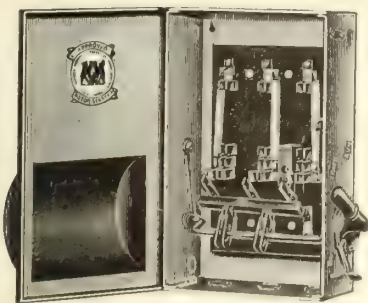
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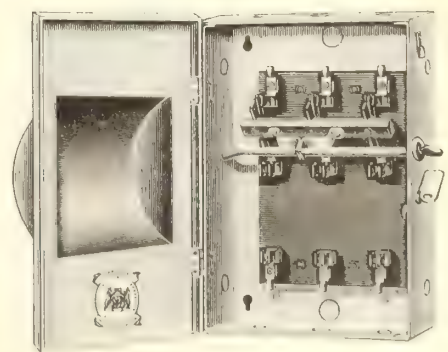
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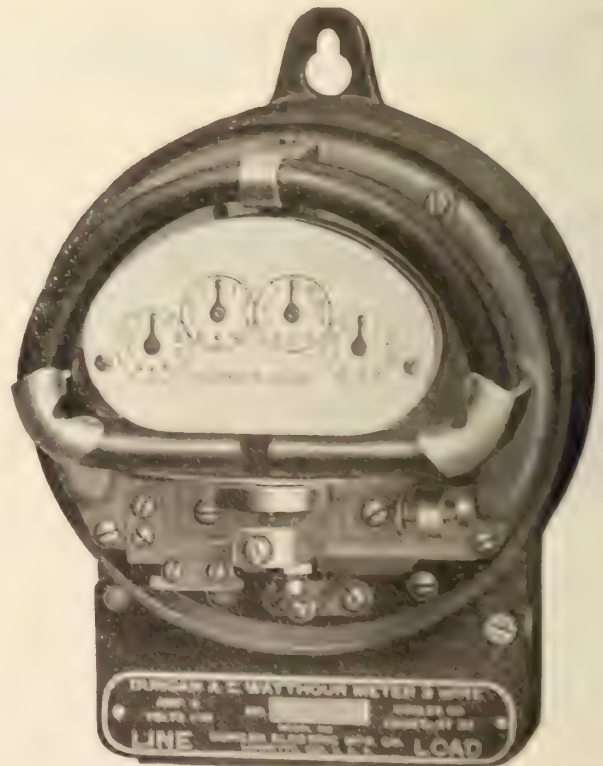
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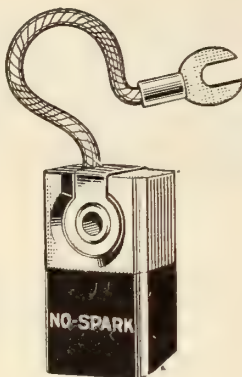
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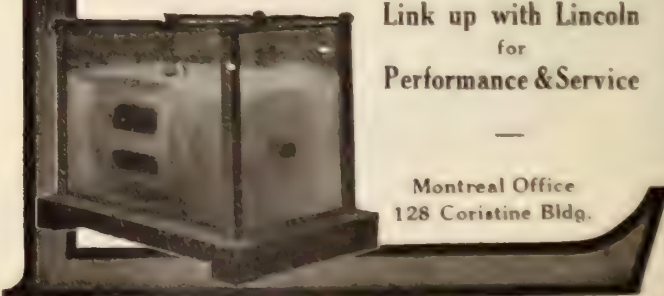
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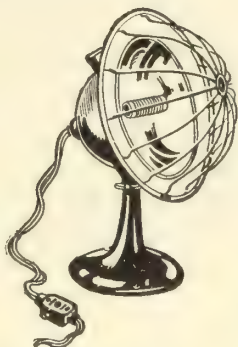
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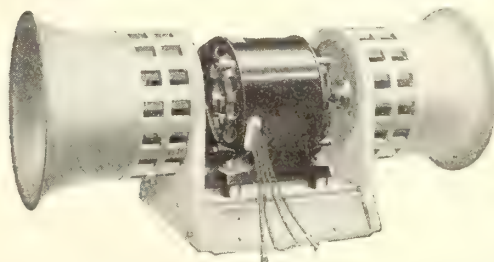


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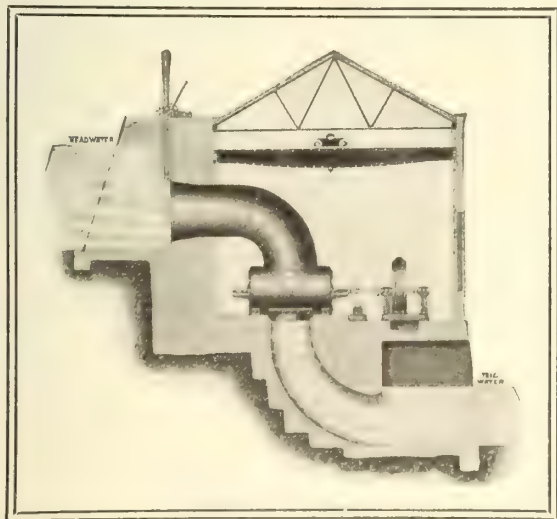
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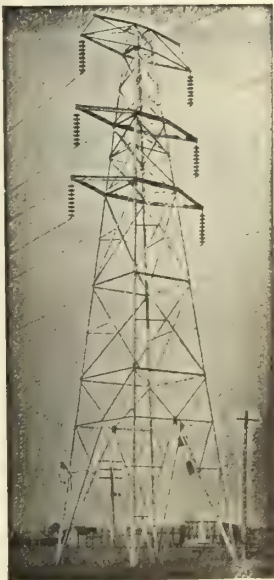


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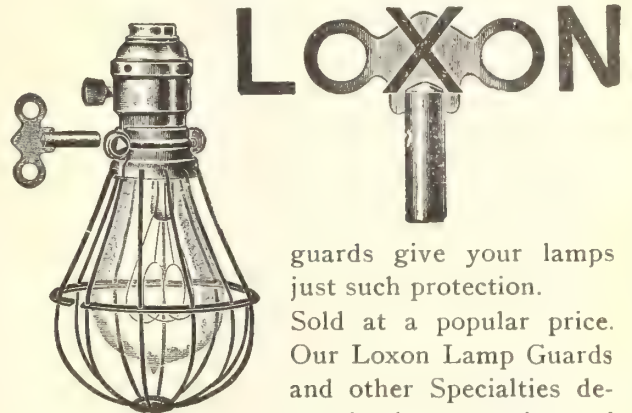
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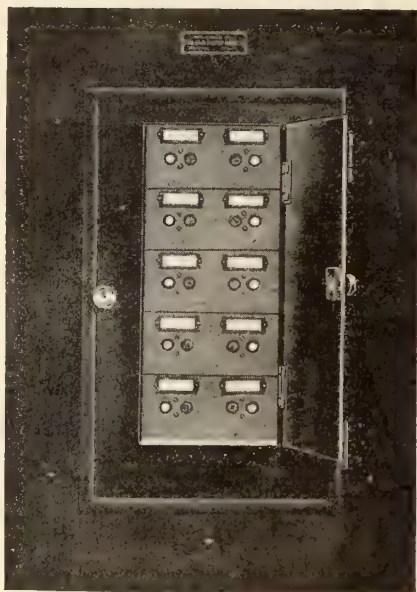
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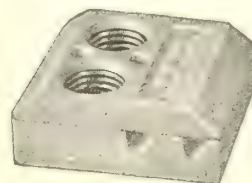
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Electric Motor & Machinery Co., Ltd.
Northern Electric Company
Ohio Brass Company
T. C. White Electric Supply Co.

ELECTRIC SOLDERING IRONS

Clemens Electrical Corporation

ELECTRIC SWITCH BOXES

Canadian General Electric Co., Ltd.
Canadian Drill & Electric Box Company
Dominion Electric Box Co.

ELECTRICAL TESTING

Electrical Testing Laboratories, Inc.

ELEVATOR CONTRACTS

Dominion Carbon Brush Co.

ENGINES

Boving Hydraulic & Engineering Co. of Canada
Canadian Allis-Chalmers Company

FANS

Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Century Electric Company
Great West Electric Company
McDonald & Willson
Northern Electric Company
Renfrew Electric Company
Robbins & Myers

FIBRE (Hard)

Canadian Johns-Manville Co.
Diamond State Fibre Co. of Canada, Ltd.

FIBRE (Vulcanized)

Diamond State Fibre Co. of Canada, Ltd.

FIRE ALARM EQUIPMENT

Canadian Hart Accumulator Company
Hatheway & Knott, Inc.
Northern Electric Company
Slater & Barnard

FIXTURES

Denson-Wilson Electric Co.
Crown Electrical Mfg. Co., Ltd.
Canadian General Electric Co., Ltd.
Duquesne Electric & Mfg. Co.
Jefferson Glass Company
McDonald & Willson
Northern Electric Company
Tallman Brass & Metal Company

FLASHLIGHTS

Canadian National Carbon Company
McDonald & Willson, Ltd.
Northern Electric Company
Spielman Agencies, Registered

FLEXIBLE CONDUIT

Canadian Triangle Conduit Company
Hatheway & Knott, Inc.
Slater, N.

FUSES

Canadian General Electric Co., Ltd.
Canadian Johns-Manville Co.
Canadian Westinghouse Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
International Machinery & Supply Company
Moloney Electric Company of Canada
Northern Electric Company

THIS TRADE MARK



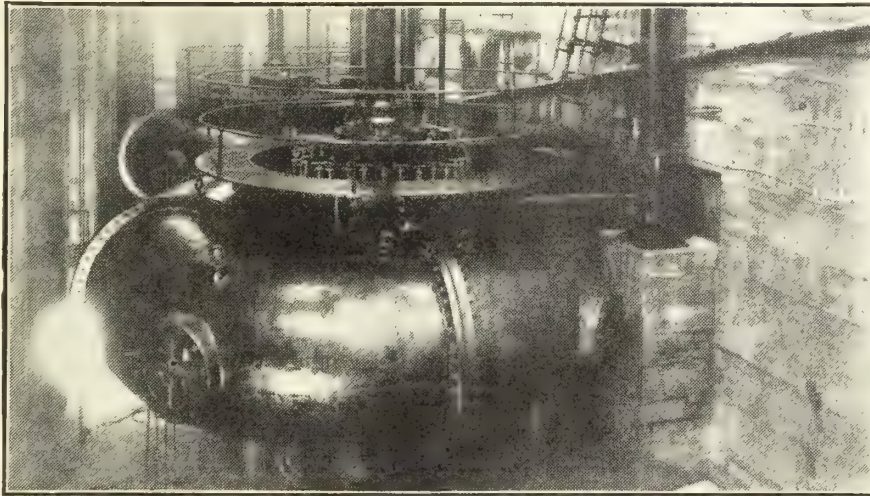
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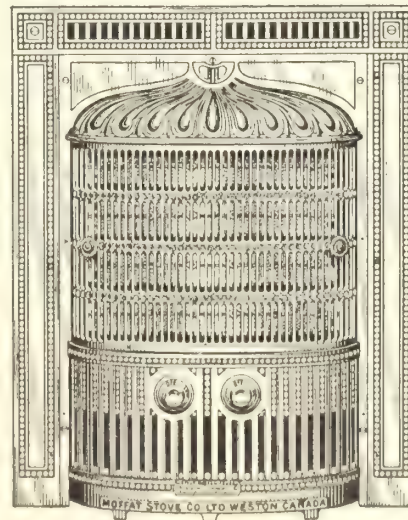


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Winnipeg,

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Manitoba

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED

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Arts Electrical Company

FUSE BOXES

Canadian Drill & Electric Box Co.
Northern Electric Company

GEARS AND PINIONS (Noiseless)

Diamond State Fibre Co. of Canada, Ltd.

GENERATORS

Canadian Crocker-Wheeler Company
Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
Lancashire Dynamo & Motor Company
Lincoln Electric Company of Canada
Northern Electric Company
Thomson Company, Limited
Toronto & Hamilton Electric Company

GLASSWARE

Consolidated Lamp & Glass Company
Jefferson Glass Company

GROUNDING BOXES

Electrical Development & Machine Co.

GUARDS (Lamp)

International Machinery & Supply Co.
McGill Manufacturing Company

HANGERS (Cable)

Standard Underground Cable Company of Canada, Limited

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Hamilton Company, Wm.
Smith Company, S. Morgan

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Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Electrical Appliances, Ltd.
Hatheway & Knott, Inc.
Hubbell Electric Products Co.
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company
Spielman Agencies, Registered

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Electrical Engineers Equip. Co.

HYDRAULIC MACHINERY

Boving Hydraulic & Engineering Company

ILLUMINATING GLASSWARE

Jefferson Glass Company

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Allen Inspection Company
Canadian Inspection and Testing Laboratories

INSULATING VARNISHES AND MOULDING COMPOUNDS

Canadian Johns-Manville Company
Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
Spielman Agencies, Registered

INSTRUMENTS

Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Hatheway & Knott, Inc.
Northern Electric Company
Sangamo Electric Company of Canada, Ltd.

INSTRUMENT CUTOUT SWITCHES
Electrical Development & Machine Co.

INSTRUMENTS—RECORDING

Northern Electric Company

INSULATION

Canadian Johns-Manville Company
Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
International Machinery & Supply Co.

INSULATION (Hard Fibre)

Diamond State Fibre Co. of Canada, Ltd.

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Canadian Porcelain Company
Canadian Westinghouse Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Moloney Electric Company of Canada
Mica Company of Canada
Northern Electric Company
Ohio Brass Company
T. C. White Electric Supply Co.

INSULATING CLOTH

Packard Electric Company

INSULATING VARNISHES

Canadian Johns-Manville Co.

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Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company

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Meyer Bros.

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Jefferson Glass Company

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Manufacturers Trading & Holding Co.
Standard Silk Shades, Ltd.

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Canadian General Electric Co., Ltd.
Canadian National Carbon Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto
Northern Electric Company

LANTERNS (Electric)

Canadian National Carbon Company
Duncan Electrical Company
Spielman Agencies, Registered

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Moloney Electric Company of Canada
Northern Electric Company

LIGHT-REGULATORS

Dominion Battery Company

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Electric Service Supplies Company
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Ohio Brass Company
Slater, N.
Steel Company of Canada, Limited
Steel City Electric Company

LIGHTING STANDARDS

Canadian General Electric Co., Ltd.
Dominion Steel Products
Northern Electric Company

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Slater, N.

MAGNETS

Canadian Westinghouse Company

MARBLE

Davis Slate & Mfg. Company

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Northern Electric Company

METAL SPINNING

Booth-Coulter Copper & Brass Company

METERS

Canadian General Electric Co., Ltd.
Canadian National Carbon Company
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
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Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lincoln Electric Company
Northern Electric Company
Packard Electric Company
Sangamo Electric Company of Canada, Ltd.

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Fillion, S. O.
Kent Brothers
Mica Company of Canada

MOTORS

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Canadian National Carbon Company
Canadian Westinghouse Company
Century Electric Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Company
Ferranti Meter & Transformer Mfg. Co.
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Thomson Company, Limited, Fred.
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Moloney Electric Company of Canada

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Northern Electric Company
Ohio Brass Company

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Benjamin Electric Manufacturing Company
Canadian General Electric Co., Ltd.
Canadian Krantz Manufacturing Company
Devoo Electric Switch Company
Northern Electric Company

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McGill Manufacturing Company
Spielman Agencies, Registered
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Fetherstonhaugh & Hammond
Ridout & Maybee

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Slater, N.

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Boving Hydraulic & Engineering Company
Hamilton Company, Wm.

PLUGS

Benjamin Electric Manufacturing Company
Hatheway & Knott, Inc.

POLES

Lindsley Brothers Company
Northern Electric Company

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Canadian Johns-Manville Co.
Northern Electric Company
Slater, N.
Steel Company of Canada, Limited

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Canadian Porcelain Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
Ohio Brass Company

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Electrical Development & Machine Co.

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Electrical Development & Machine Co.

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G. & W. Electric Specialty Company
Northern Electric Company
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Boving Hydraulic & Engineering Company
Canadian General Electric Co., Ltd.
Electric Motor & Machinery Co., Ltd.
MacGovern & Company

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Boving & Company of Canada
Canadian Allis-Chalmers Company

RECEPTACLES

Benjamin Electric Manufacturing Company
Canadian General Electric Co., Ltd.
Diamond State Fibre Co. of Canada, Ltd.
Monarch Electric Company
Northern Electric Company
Paulding, John I.

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Benjamin Electric Mfg. Co.
Pittsburgh Reflector & Illuminating Co.

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Electrical Maintenance & Repairs Company

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Marchand Electric Works
Thomson Company, Fred.
Toronto & Hamilton Electric Co., Ltd.

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McDonald & Willson, Ltd., Toronto
McGill Mfg. Co.
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CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

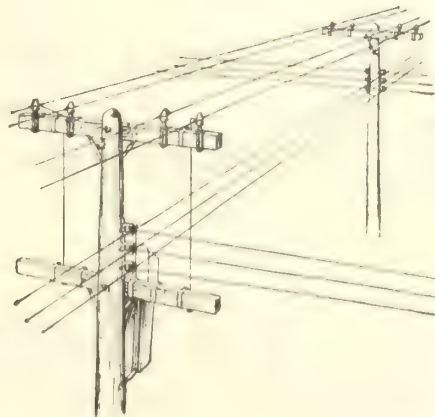
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Peirce Brackets

Peirce Pole Line Hardware

Patented



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National Electric Heating Company
Renfrew Electric Company

STORAGE BATTERIES

Canadian General Electric Co., Ltd.
Canadian Hart Accumulator Company
Canadian National Carbon Company
Exide Batteries of Canada, Ltd.
Northern Electric Company

STREET LIGHTING FIXTURES

Benjamin Electric Manufacturing Company
Canadian General Electric Co., Ltd.
Northern Electric Company
Winter Joyner, A. H.

SWITCHBOARD SLATE AND MARBLE

Davis Slate & Manufacturing Company

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Canadian Drill & Electric Box Company
Canadian Johns-Manville Co.
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Devoe Electric Switch Company
Electrical Maintenance & Repairs Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto.
Moloney Electric Company of Canada
Northern Electric Company
Paudling, John I.

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Canadian Westinghouse Company
Devoe Electric Switch Company
Ferranti Meter & Transformer Mfg. Co.
Moloney Electric Company
Monarch Electric Company
Northern Electric Company

SWITCH GEAR

Ferranti Meter & Transformer Mfg. Co.
Monarch Electric Company

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Packard Electric Company
Northern Electric Company

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Century Telephone Construction Company
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Electrical Appliances, Ltd.
Equator Manufacturing Company
Hubbell Electric Products Co.
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company

TOOLS

Northern Electric Company

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Killark Electric Manufacturing Company

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Canadian Westinghouse Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
Kuhlman Electric Company
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Monarch Electric Company
Northern Electric Company
Packard Electric Company
Standard Transformer Company

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Canadian Bridge Company

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Ohio Brass Company

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Northern Aluminum Company

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Canadian Westinghouse Company
Barber & Sons, Chas.
Boving Company of Canada
Canadian Allis-Chalmers Company
Hamilton Company, Wm.
MacGovern & Company
Smith Company, S. Morgan

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Northern Electric Company
Standard Underground Cable Co. of Canada, Ltd.

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Franke Levasseur & Co.
Hoover Suction Sweeper Co. of Canada, Ltd.
McDonald & Willson, Ltd., Toronto
Northern Electric Company

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Hurley Machine Company
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Slade Mfg. Co.

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Smith Company, S. Morgan

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Lincoln Electric Company of Canada

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Boston Insulated Wire & Cable Company, Ltd.
Canada Wire & Cable Company
International Machinery & Supply Co.
McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited

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5—1/6 H.P. 1 phase, 60 cycle, 1750 RPM. 110 volts, new each	30.00
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We also have oil and gasoline engines of all sizes.
We have some new 1, 2, 3 and 5 H.P. Westinghouse motors, never uncrated, at surprising prices.

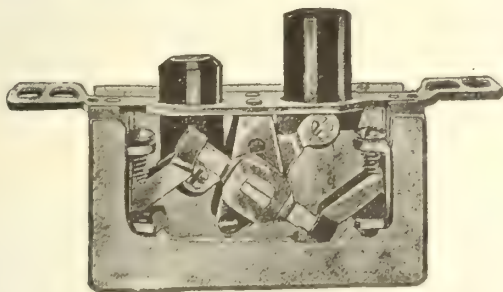
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R. G. Lee, General Manager

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THE New England Push Switch



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If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

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Our "Fair List" No. 7

Gives Prices and Shipping Weights
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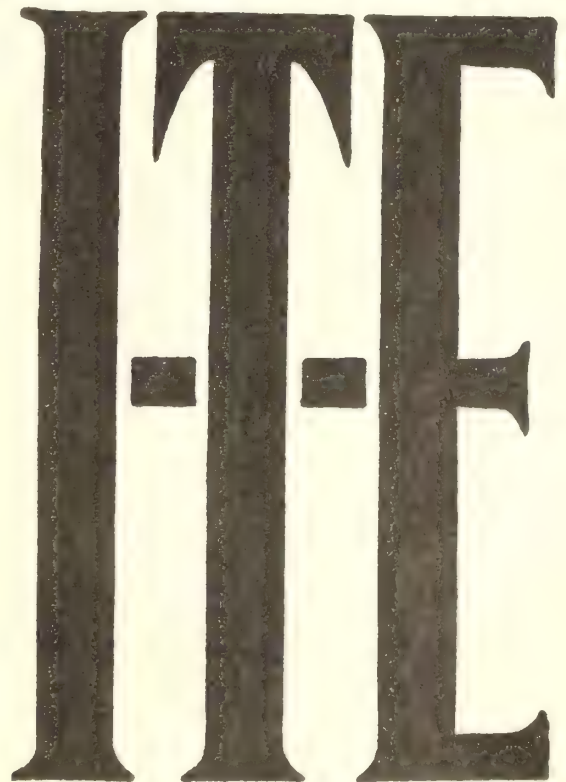
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181 Shaftsbury Avenue, Toronto, Can.

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Double the Life of Your Pole Lines

By using our

OPEN TANK TREATED

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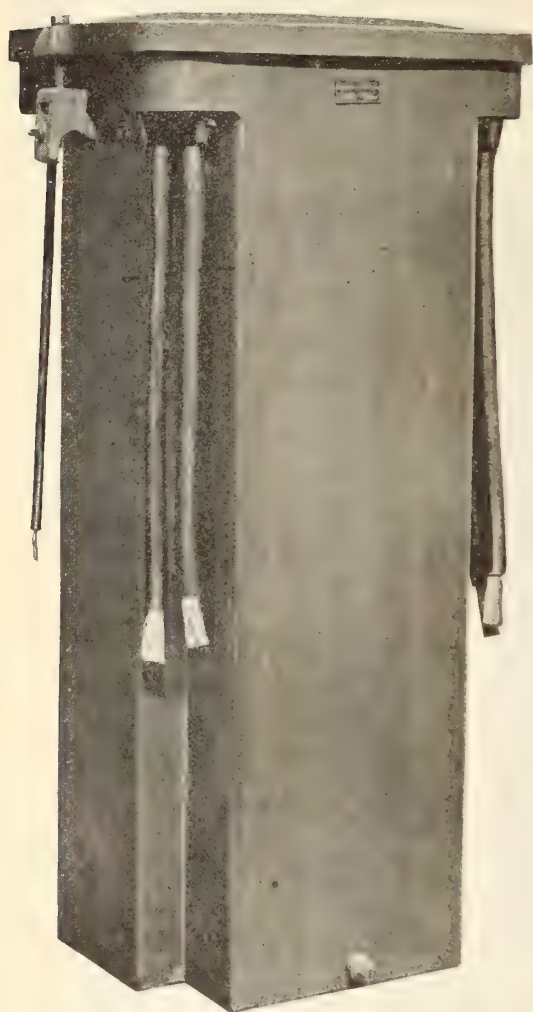
They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices No obligation.

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The Steel-Clad Type S Distribution Transformer



Westinghouse 25 Kv.a., 25 Cycle, Type S Steel-Clad Transformer

The same reliable Type S design, in regard to coil winding and insulation but one-third lighter in weight, thereby reducing freight charges and pole strain.

The only way we knew to improve Type S Transformers was to lighten the cases.

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FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.

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WINNIPEG—158 Portage Ave. E.

VANCOUVER
1090 Mainland St.

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CALGARY—316 Third Ave. E.



Westinghouse

A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

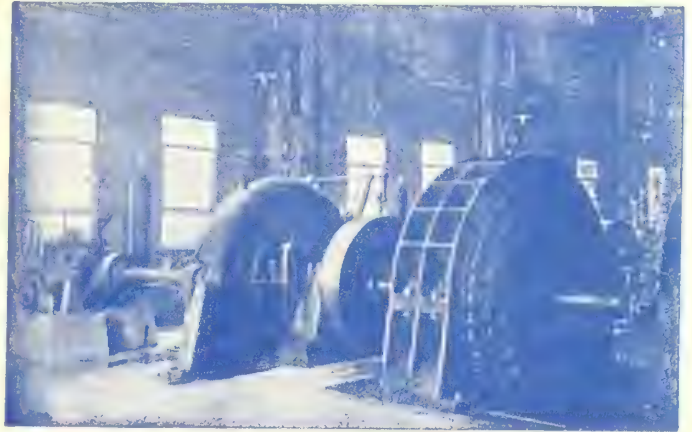
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

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Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

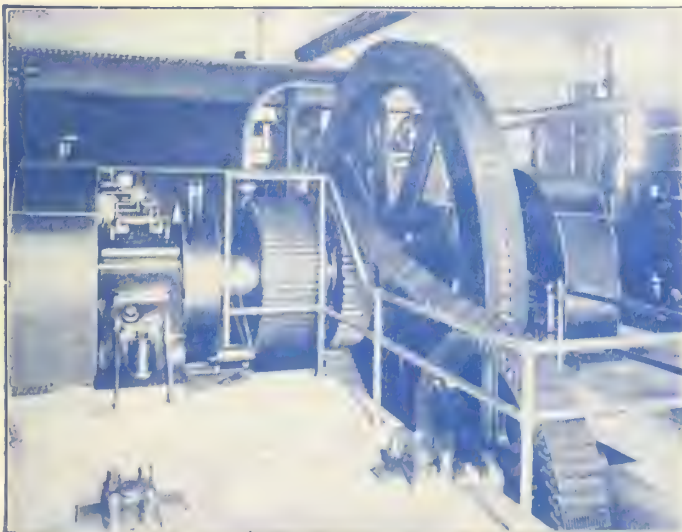
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The Sign of Efficiency The Sign of Durability

Positive as Gears Flexible as a Belt

Longer Life

THE MORSE "ROCKER JOINT"



1000 and 500 H. P. Morse Silent Chain Drives - from Engine to Line shaft

Save power and space

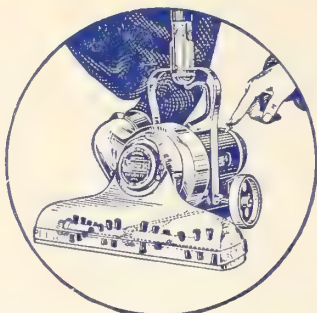
Send us your transmission problems

Jones & Glassco Reg'd

Canadian Agents

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TORONTO

St. Nicholas Building.
MONTREAL



Observe "that lever." It gives you two machines in one

This two-in-one cleaner sells itself in competition. Design, workmanship and the scientific principle of cleaning appeal to your prospective customers. Write us for information regarding this wonderful machine which increases your sales and profits.

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Machines, National Electric Ap-
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Vacuum Cleaners.

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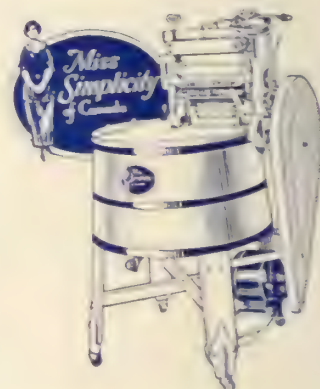
The Electric Sweeper Vac.

is Two Cleaners in One

FIRST—Because it cleans by powerful suction plus a correctly speeded brush.

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**EARLE
LIMITED
ELECTRIC**



66-72 Nelson St.

TORONTO, ONT.



Can You Isolate 90%?

Practically 90% of street lighting outages are due to troubles occurring above ground.

With the G & W Disconnecting Series Pothead each post is an independent unit above the sidewalk level.

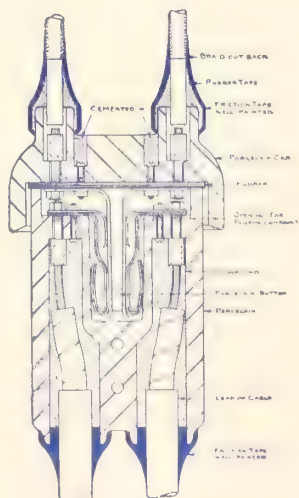
The underground cables are sealed at the bottom of the post and the post leads are connected to the detachable cap of the pothead. The entire post may be removed without disturbance to any permanent electrical connection. In case of accidental post wrecks there need be no high voltage above ground.

For testing; each post can be "rung out," also each section from post to post.

In repairs or replacement the patrolman is protected by a fully visible absolute physical disconnection.

Lead cables must be sealed. A cutout is essential to the best service.

The combination of cable seal and cutout into one small device is available under G & W patents, at the price of one device.



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Electrical

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Engineering Contracting Merchandising Transportation

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Ask our nearest Branch House for particulars.



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The Modern Method of Communication

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Largest Canadian Manufacturers of Bare and Insulated Wires and Cables



The Beacon Signal - A.D. 1000

Northern Electric Company LIMITED



The Smoke Signal - A.D. 1700

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VANCOUVER	



The Pony Express - A.D. 1850

TO THE EXECUTIVES

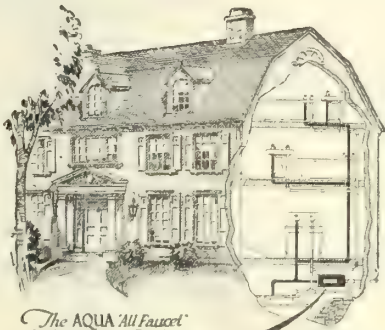
OF
CENTRAL STATIONS

OF
INDUSTRIES

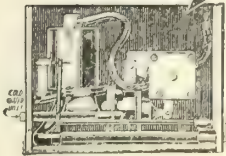
INSTANTANEOUS HOT WATER

BY ELECTRICITY

*No Boilers — No Pilot Light — No Gas Escape — No
Explosions — No Odors — No Vents — No Suffocation*



*The AQUA "All Faucet"
Instantaneous Electric
Water Heater — shown
with cover removed*



A compact device 16" x 12" x 9" all enclosed, sealed and installed out of sight. Usually in the cellar.

The Aqua Electric Water Heater

advertising is going to stir up a lot of interest among your metered customers.

Members of your company are going to be asked about "the Aqua".

Every man in your organization ought to be able to handle these inquiries with answers that will further central station service for water heating.

Electric water heating should be thoroughly sold to every house owner, and particularly those building new homes.

This service can be best handled by electricity and it is one of the Central Stations biggest source of income.

The "Aqua" campaign is going to put over central station service in water heating—provided it gets central station support and cooperation—and it merits it.

Full data will be gladly sent.

MANY manufacturing processes require hot water.

All manufacturing plants need hot water in wash rooms, rest rooms, first-aid rooms, etc.

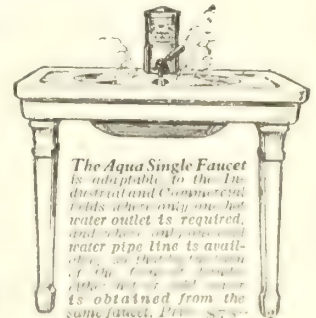
To properly meet such demands two models of the Aqua Electric Water Heater are supplied.

The Aqua "All Faucet" Type provides hot water for any number of faucets on the hot water line.

Double safety protected—operates automatically under any water conditions, guaranteed one year against defective material and workmanship, will last indefinitely—costs less than any other kind of Automatic Water Heater—only \$175.

The Aqua "Single Faucet" Type is applicable where hot water is required from only one faucet from a cold water line—this type sells for \$75. (See illustration)

Write us for full data.



*The Aqua Single Faucet
is adaptable to the In-
dustrial and Commercial
fields where only one hot
water outlet is required,
and where only one cold
water pipe line is avail-
able. The compact design
of the Aqua Single Faucet
type heater and water
is obtained from the
same faucet. Price \$75.*

CORRESPONDENCE SOLICITED WITH DEALERS WRITE FOR OUR SPECIAL TERMS

The Aqua Electric Heater Company of Canada Limited

50 Notre Dame, West Montreal, P. Q.

American Office: 250 West 54th St., New York, N. Y. Factories: St. Hyacinthe, P. Q., Canada. Bridgeport, Conn., U.S.A.



Antique Gold or
Antique Bronze
Finish. Two
lights. Shade of
metal overlay and
amber glass.

Height 22 inches.

Catalogue No. L. 2600



A Winner From the Word Go

MODERATE in price, beautiful in design, this Miller Library Lamp is distinctive enough for a mansion, yet within the means of all.

For a quick mover, we can conscientiously recommend this lamp. The extremely reasonable price coupled with its charming appearance combine to make a real business-getter.

Portable Lamps make a very seasonable window display at this time of the year. Our district office you do business with, will be more than pleased to make suggestions and render every assistance.

Canadian General Electric Co., Limited

HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

ANOTHER BEAVERDUCT INSTALLATION

BEAVERDUCT has been adopted by the Toronto Transportation Commission for use on their new street cars. Once again, quality has fittingly demonstrated its ability to withstand competition.



Beaverduct is "Made in Canada" in a modern plant under the supervision of the best engineers available. Beaverduct is produced under the underwriters' inspection. Its use on such an installation as the new Toronto Street Cars is a fitting testimonial of its superiority.



Good conduit can only be produced in a plant where the equipment permits only absolutely clean material being used. Electrical apparatus and plating solutions must be kept up to the mark under scientific management. The proper application of the enamel, after the galvanizing of the outside, is of vital importance. And, lastly, rigid inspection.

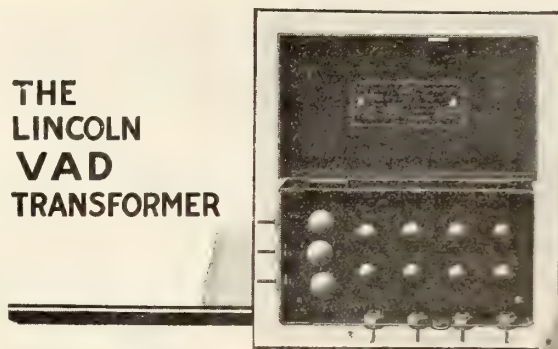
*Always Specify
"Beaverduct"*

Canadian General Electric Co., Limited

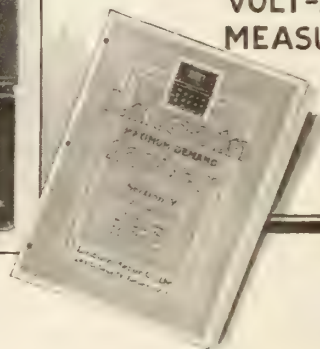
HEAD OFFICE - TORONTO

Branch Offices: Halifax, Sydney, St. John, Montreal, Quebec, Sherbrooke, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Vancouver, Nelson and Victoria.

THE
LINCOLN
VAD
TRANSFORMER



THE BOOK ON
VOLT-AMPERE
MEASUREMENT



Have You Investigated Lincoln Volt-Ampere Demand Measurement?

HAVE you looked into this method of measuring volt-amperes recently given so much attention by electrical authorities in both the Dominion and in the United States.

Leading electrical papers have given pages to the subject—papers on it have been read before many electrical gatherings.

And why not?—The accurate measurement of demand on a volt-ampere basis is recognized as the correct means of obtaining absolute fairness in billing. Taking power factor into consideration, in billing current users, marks one of the greatest strides ever made toward satisfaction and certainty in billing.

Read how you can obtain these results by using the Lincoln V A D Transformer working in conjunction with the well known Lincoln Maximum Demand Meter, which operates on the thermal principle—write for Section V of the Lincoln Meter Catalog. You will be under no obligations whatever.



Hand now on left varies with load and shows this load at any time of day

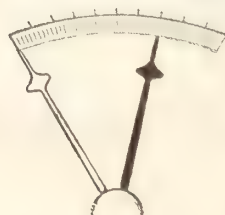
Hand now on right moves only to right and indicates maximum load since last re-setting.

The Lincoln Meter Co., Limited

243 College Street, Toronto, Canada

Cable "Meters" Toronto Phone College 1374

Lincoln
MAXIMUM DEMAND
meter

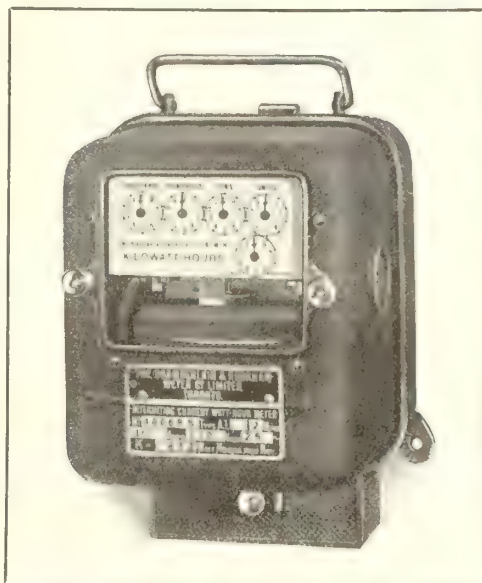


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World

USED ELECTRIC MOTORS

IN STOCK NOV. 5th

ALTERNATING CURRENT

550 Volts 3 Phase 60 Cycle				220 Volts 3 Phase 60 Cycles			
H.P.	1800	R.P.M.		H.P.	1800	R.P.M.	
3	1800	1800	Westinghouse	5	1800	1800	Fairbanks
3	1800	1800	Westinghouse	7	1800	1800	A.C.B.
5	1200	1200	Thomson	10	1200	1200	S.G.E.
5	1200	1200	A.C.B.	10	870	870	A.C.B.
5	900	900	Westinghouse	25	1200	1200	T. and H.
5	900	900	Ckr.-Wheeler	60	1200	1200	Ckr.-Wheeler
7	1200	1200	Thomson	75	900	900	Westinghouse
7	1200	1200	A.C.B.	75	720	720	Westinghouse
7	1200	1200	G.E.	100	720	720	Fairbanks
7	1200	1200	Westinghouse				
7	900	900	Westinghouse				
10	1800	1800	C.G.E.				
10	1200	1200	C.G.E.				
10	1200	1200	Westinghouse				
10	900	900	Ckr.-Wheeler				
15	1200	1200	Thomson				
15	1200	1200	Westinghouse				
15	1200	1200	Ckr.-Wheeler				
15	720	720	Allis Chalmers				

1-75 1-2300 2300 volt 3 phase 60 cycles 900 rpm C.G.E. revolving field type generator
1-250 250 volt 3 phase 60 cycles 600 rpm C.G.E. revolving field type generator

All the above thoroughly overhauled, in first class condition and guaranteed.

NEW MOTORS

We build our standard type D
We can made prompt deliveries

THOMSON MOTOR

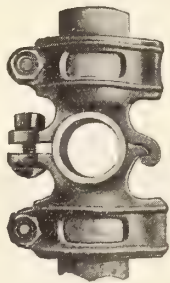
in all sizes up to 25 H. P.
Write for our Price List.

FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL



erie
Fittings

10,000 COMBINATIONS

The name "ERIE" is attracting world-wide attention in the field of electrical pipeframe construction because ERIE Fittings embody

Simplicity in design

Adaptability to use

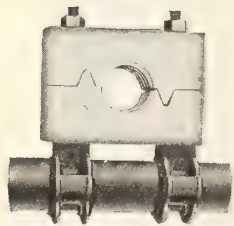
Superiority over all former types

The **MODERN** and **PRACTICAL FITTINGS**

The **Savers** of **Time, Labor and Money.**

Don't forget "ERIE" is their name.

Catalogue on request

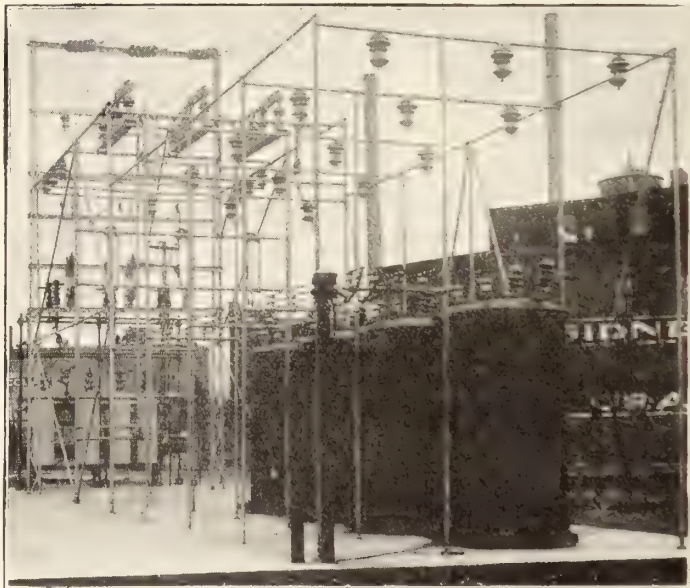


ERIE ELECTRICAL EQUIPMENT COMPANY, Inc.

Main Office and Factory JOHNSTOWN, PA.

Offices in all principal cities

Canadian offices 414 St. James St., Montreal.



Outdoor Substation 33000/2300 volts

OUTDOOR SUBSTATIONS

"Three E" Outdoor Substations have always borne distinguishing characteristics which have made them stand out strong, when compared with others. The Pipe Frame Structure was a distinct "Three E" Creation and from a standpoint of strength, ease of installation and economy it has decided advantages.

Our Choke Coils, Switches, etc. have earned a reputation for reliability in service second to none.

Send us a single line diagram of the station you require and we will submit you a proposition that will please you.

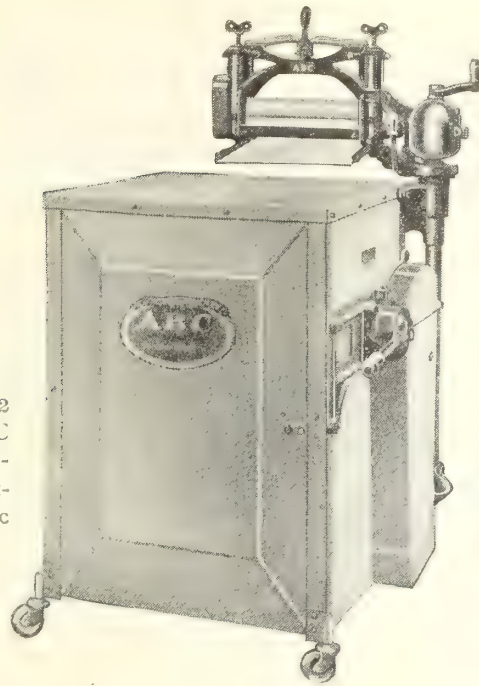


Electrical Engineers Equipment Co.

35 S. Desplaines St., CHICAGO, U. S. A.

Northern Electric Company Canadian Representatives
LIMITED

The new 1922 model A B C Electric Laundress—"the Packard of Electric Washers."



You see a handsome cabinet; you hear no noise; you feel no vibration.

The "Packard" of the Complete A B C Line

The new 1922 model A B C Electric Laundress, embodying no less than 24 vital refinements as a result of our thirteen years' success in this business, out-ranks other washers as the Packard Twin-Six shoulders above ordinary automobiles.

Graceful in its proportions, handsomely finished in gray and nickel, powerfully and reliably motored, extremely quiet and smooth in operation, and finely constructed in every part, it stands unexcelled

And yet it sells at a moderate price—a price that also allows the dealer a liberal profit, from which he will need to deduct little or no expense for service. For ABC washers are built to minimize that necessity.

Other A B C electric and power-driven washers similarly excel in their respective classes. There are ten A B C washers in all—washers from the "Ford" class up to the "Packard." Every price demand is met by the A B C line.

Each electric A B C is also equipped to operate the A B C Electric Ironer, without need for an additional motor.

A few A B C territories are still open for exclusive dealers. Continent-wide distribution, quick service, effective sales co-operation and liberal discounts, make the A B C Line worthy of your immediate consideration.

Write direct to C. D. Henderson, or to any of the distributors listed below.

A B C *Electric Laundress*
WASHES WRINGS IRONS

C. D. Henderson - Canadian Representative
Box No. 123, Brantford, Ont.

WHOLESALE DISTRIBUTORS

MARITIME PROVINCES
 Blackadar & Stevens,
 Roy Building,

Halifax - - N.S.

ONTARIO
 Masco Co., Ltd.,

78 Richmond St. - Toronto

ALBERTA
 Cunningham Electric Co., Ltd.,
 Calgary

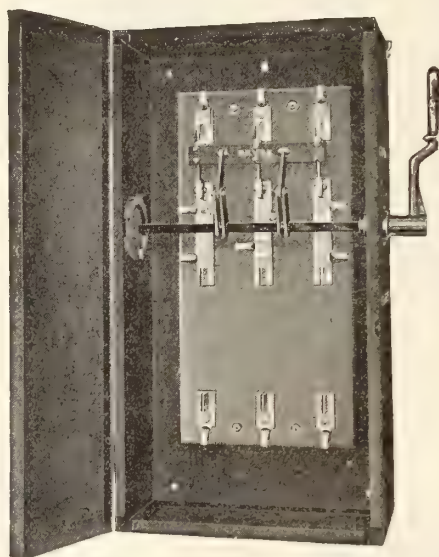
QUEBEC

Dawson & Co., Ltd.,
 148 McGill St. - Montreal

SASKATCHEWAN
 Sun Electrical Supply, Ltd.,
 Regina

BRITISH COLUMBIA
 Rankin & Cherrell,
 Vancouver

DEVOE EXTERNALLY OPERATED COMPENSATOR SAFETY SWITCHES



This switch can be arranged to connect to any compensators. You will note that there are twelve lugs. In connecting for a C.G.E. Compensator remove three of the lugs shown between hinge and fuse base. If the switch is required to be connected to any other make of compensator such as Westinghouse, etc., simply remove the three straps and use the 12 lugs as shown on cut. The box can be supplied with nine porcelain bushings or slotted at bottom to fit over compensator.

THE DEVOE ELECTRIC SWITCH COMPANY

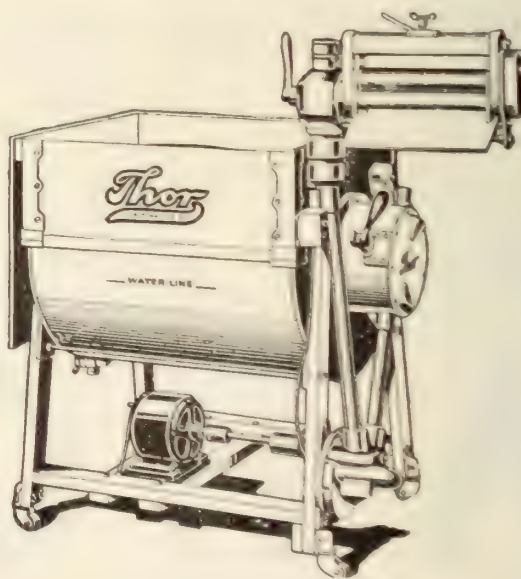
414 Notre Dame West, Montreal, and 105 Victoria St., Toronto, Ont.

Thor

Electrical Dealers:

Think what it means to be able to say to
to your prospects,

"Over 600,000 women are using this
washing machine."



Hurley Machine Co., Ltd.

Ryrie Bldg.

TORONTO, CANADA

Galvaduct



Extension of Head Office of Mutual Life Assurance Co. of Canada, Waterloo, Ont.
 Sharp and Horner, Architects Beattie-McIntyre Company, Electrical Contractors

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Loricated

Always specify GALVADUCT or LORICATED CONDUITS

If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

—Single Wall

—Indestructible

“TRIDUCT”

—Easy Fishing

—Full Coils

—Made in Canada

Selling Agents—

CONDUITS COMPANY, LTD.

33 Labatt Ave. - - Toronto.

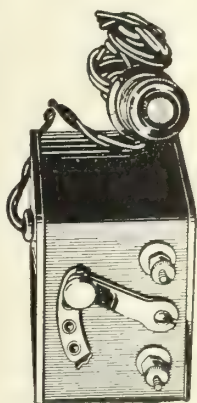
COMBINE THE AGES

The Boy is a Good Buyer THESE ARE GOOD Xmas Presents for the Adults

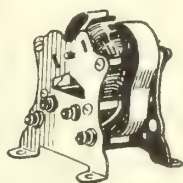
His financial backing is usually a syndicate of Self, Father, Mother, Uncles, Grandfather, Grandmother and Aunties.

They all love to encourage his rising Genius.

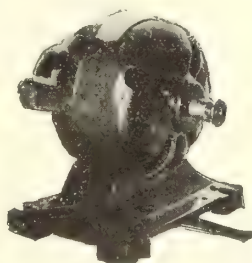
We Cater to this in a big way,
and recommend to the Electrical Dealer the following:



Toy Transformers for
Trains and Construc-
tion Toys



P 58 Motor



P 56 Universal Motor

Toy Motors for Battery, Transformer
and Direct socket use

This is a
Toy Set

Retail
\$750



Wireless sets from the Toy set to the big Amateur and Professional set that will receive over a range of 500 miles.

Other sets that will draw a crowd to your windows are:

Electrical sets, Phono sets, Telegraph sets, Weather Bureau,
Electric Tanks, Tool Chests

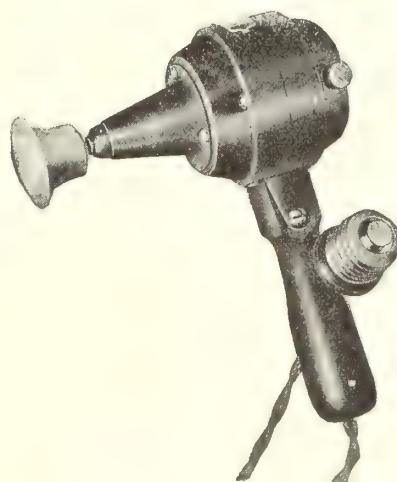
Send for Catalogue and Price List.

DO IT NOW

The A. C. Gilbert-Menzies Co., Ltd., 439 King St., W. Toronto

Gilbert's Polar Cub Fans and Electrical Specialties

Gilbert's Toy Motors and Wireless Sets



Retail
\$795

Retail
\$795

Gilbert's B 87 Vibrator

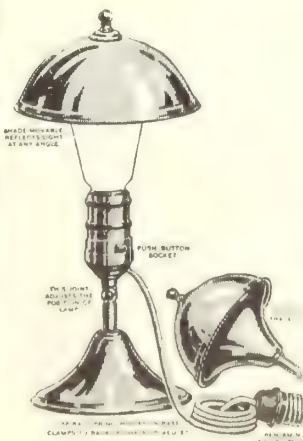
The lowest priced and most efficient motor driven
Vibrator for Home use.

The motor is the same as used in the famous Polar
Cub Fan (model E).

B 86 Vibrator with switch attachment Retails \$15.00

Polar Cub Sewing Machine Motor Retails \$15.00

Send for Polar Cub Electrical Specialty Catalogue



The Wallace Lamp

Sells like hot cakes as a gift

Buy our 1 doz. ass't \$43.20

Contains 6 Brass and 2 each
Nickel, Bronze and Green
Lamps

Makes a great Display
and produces an all year
round profit.

Moloney Transformers

RELIABLE AND EFFICIENT



Reliability under the severest conditions has always been one of the most desirable features of MOLONEY Transformers. That they are also efficient and give long service is proved by their ever increasing use from coast to coast. Let us send you full particulars.

MADE IN CANADA

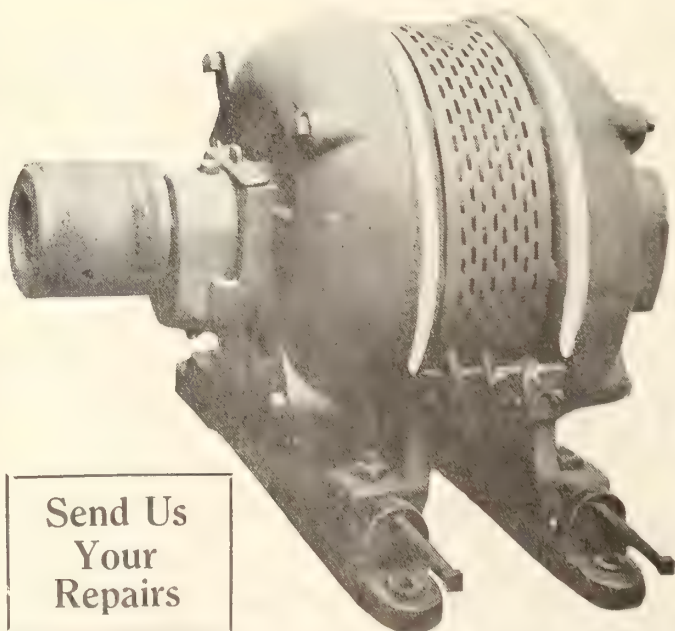
MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents: Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 138 Fort Street, Winnipeg.

District Offices: Montreal and Halifax Factory: Windsor, Ont. Head Sales Office: 1221-2 Bank of Hamilton Bldg., Toronto

Canadian Made Motors

Noted for their all round efficiency



Send Us
Your
Repairs

"Gold Band" Motors are manufactured by us and bear an absolute guarantee to give first-class service.

This they will do even when working under the most trying conditions. They are, we believe, the equal of anything imported and are certainly more modest in price.

We should be glad to send you full particulars

Marchand Electrical Works
Limited

V. A. Leclerc J. F. Lamontagne

55 Cote Street, MONTREAL
Phone Plateau 665-843

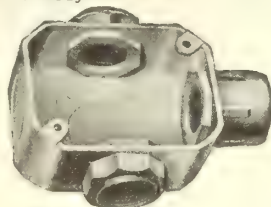
Wirelets



Catalog No. 48241
"Branch" Wirelet Body



Catalog No. 14241
"Shallow" Wirelet Body



Catalog No. 34461
"Deep" Wirelet Body

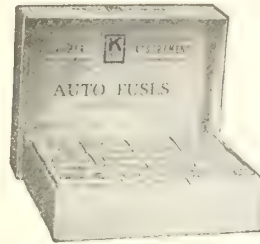


Catalog No. 1410
1/2" WIRELET COUPLING



Catalog No. 1420
1/2" WIRELET COUPLING

STEEL CITY ELECTRIC COMPANY



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment "The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

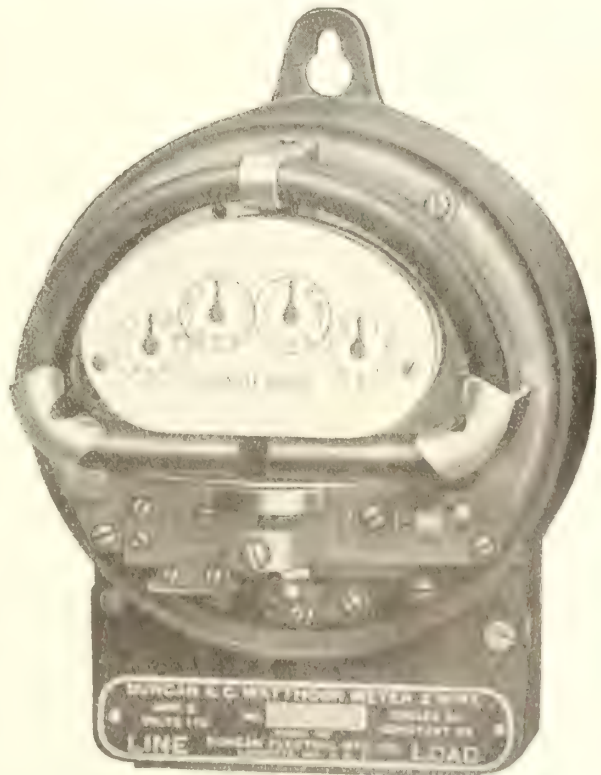
DUNCAN MODEL M2

FOR ALTERNATING CURRENT SERVICE

SUPERIORITY

of construction has always been looked upon by Duncan engineers as one of the prime requisites in meter development, and this ideal is characteristically manifested in the Model M2. Its every detail towards perfection has been worked out to a degree of precision hitherto unobserved.

No other meter in use today shows the degree of accuracy on overloads as does the Duncan Model M2. Test this out for yourself. Its magnet is so satisfactory and dependable that it is looked upon as opening up a new era of design for permanency.



THE GEORGE C. ROUGH SALES CORP'N. 134 CORSTINE BLDG.
MONTREAL

ANNOUNCING—

The New Highly Efficient Glass for Lighting



Sol-lux Glass is a new discovery of the Jefferson Factory and will meet and surpass any lighting tests or comparisons with the highest qualities of white glassware.

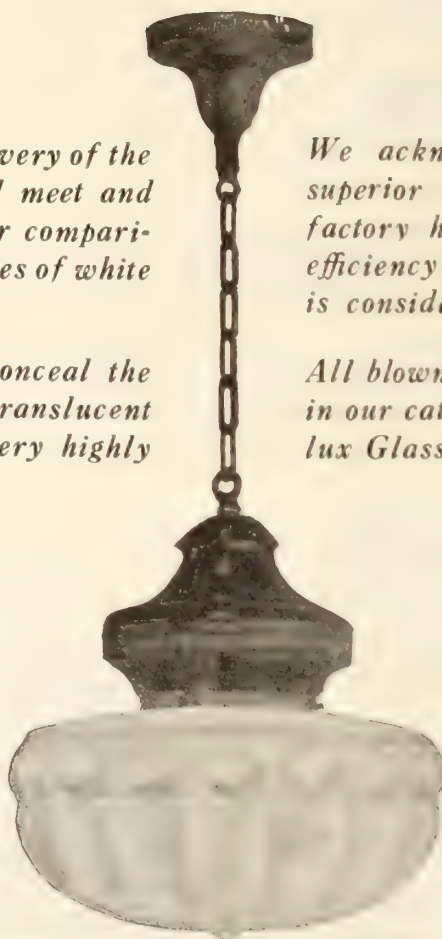
It is just dense enough to conceal the source of light and yet translucent enough to be classed as very highly efficient.

We acknowledge Sol-lux to be far superior to any production of our factory heretofore and feel that the efficiency and completeness of our line is considerably bettered.

All blown lighting pieces illustrated in our catalogues may be had in Sol-lux Glass by specifying same.

**WRITE FOR
PRICES**

**SAMPLES NOW
READY**



FACTORY & HEAD OFFICE
388 CARLAW AVE
TORONTO

DOWN-TOWN SHOWROOMS
164 BAY ST. TORONTO

Jefferson
MADE IN CANADA
Glass
COMPANY LIMITED

285 BEAVER HALL HILL
MONTREAL
272 MAIN STREET
WINNIPEG
510 HASTINGS ST. W.
VANCOUVER

THE CROWN LITE

All Made in Canada
A. 100 Watt Size.



No. 804

Here is a popular size, it takes a 100 Watt Nitrogen Lamp and has $\frac{3}{8}$ Cap Porcelain Keyless Socket with Metal Deflector Inside Bowl.

GLASS 6" x 8 $\frac{1}{2}$ " x 10 $\frac{1}{2}$ ".

Write for new circular, showing designs for each size of lamp which we have developed.

The Crown Electrical Mfg. Co.
Brantford Limited Ontario

Diamond Fibre

It's the Universal Raw Material

STRENGTH



Bushings
Cleats
Conduits
Insulation
Fuse Tubes
Slot Wedges
Switch Bars
Switch Handles
Parts for Dynamos
& Generators
Parts for Starting,
Lighting & Ignition
Systems

Is your problem one of finding a material of high dielectric strength?

Do you require a material that is tough, and strong? One that will not crack, chip, break or deteriorate with age? Must it be adaptable to bending, twisting or forming? Is easy machinability and fine finish a factor?

Diamond Fibre will do all these things and more. Or, if you must also have extreme resistance to water try

CONDENSITE CELORON

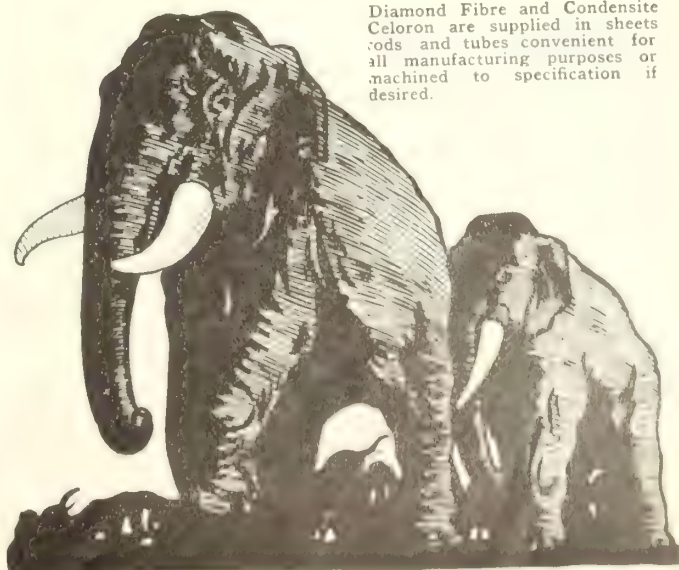
This latter material is especially adapted to radio work.

Write for further particulars or have our travellers call on you.

Diamond State Fibre Company of Canada, Limited


Head Office and Works

235 Carlaw Ave., Toronto, Canada



Diamond Fibre and Condensite Celoron are supplied in sheets, rods and tubes convenient for all manufacturing purposes or machined to specification if desired.

There is No Night



Natural light, no matter how modern may be the mill construction, cannot be depended upon solely for industrial illumination. When daylight fails correct industrial illumination must be available if "daylight efficiency" is to be maintained.



The unretouched photographs have been reproduced to show how faithfully Benjamin Industrial Reflectors maintain "daylight efficiency:"

There is no night where correct industrial illumination is provided.

Whether for office or factory, good lighting is an investment, not an expense. It pays big dividends in relieving eyestrain; reducing fatigue; checking waste; stopping spoilage and preventing accidents.

Benjamin Industrial Reflectors are paying big in increased production and improved morale in thousands of the most progressive plants of the country.

Benjamin Electric Mfg. Co. of Canada. Limited
TORONTO

212 MCGILL STREET
MONTREAL

311 CONFEDERATION LIFE BLDG.
WINNIPEG

BENJAMIN

Makers of Things More Useful

Benjamin Industrial Reflectors are designed to develop maximum usefulness of modern incandescent electric lamps. No one type of reflector could meet the requirements of all lighting conditions. In the Benjamin line there will be found a lighting unit suitable for every require-ment—industrial and commercial, general and special, and outdoor.

O-B MODERNIZED INSULATORS

***Popularity is its own
"enforcement officer"***

Carefully compiled data show that O-B Insulators are enormously popular on every class of transmission line.

This widespread use of O-B Insulators is, in itself, a guarantee of their reliability. For they are used so universally, that, unless they were practically a hundred per cent trustworthy, every power company in the country would hear about it in a few days.

As it is, O-B Insulators are being used in ever increasing proportion.

Prompt shipments.

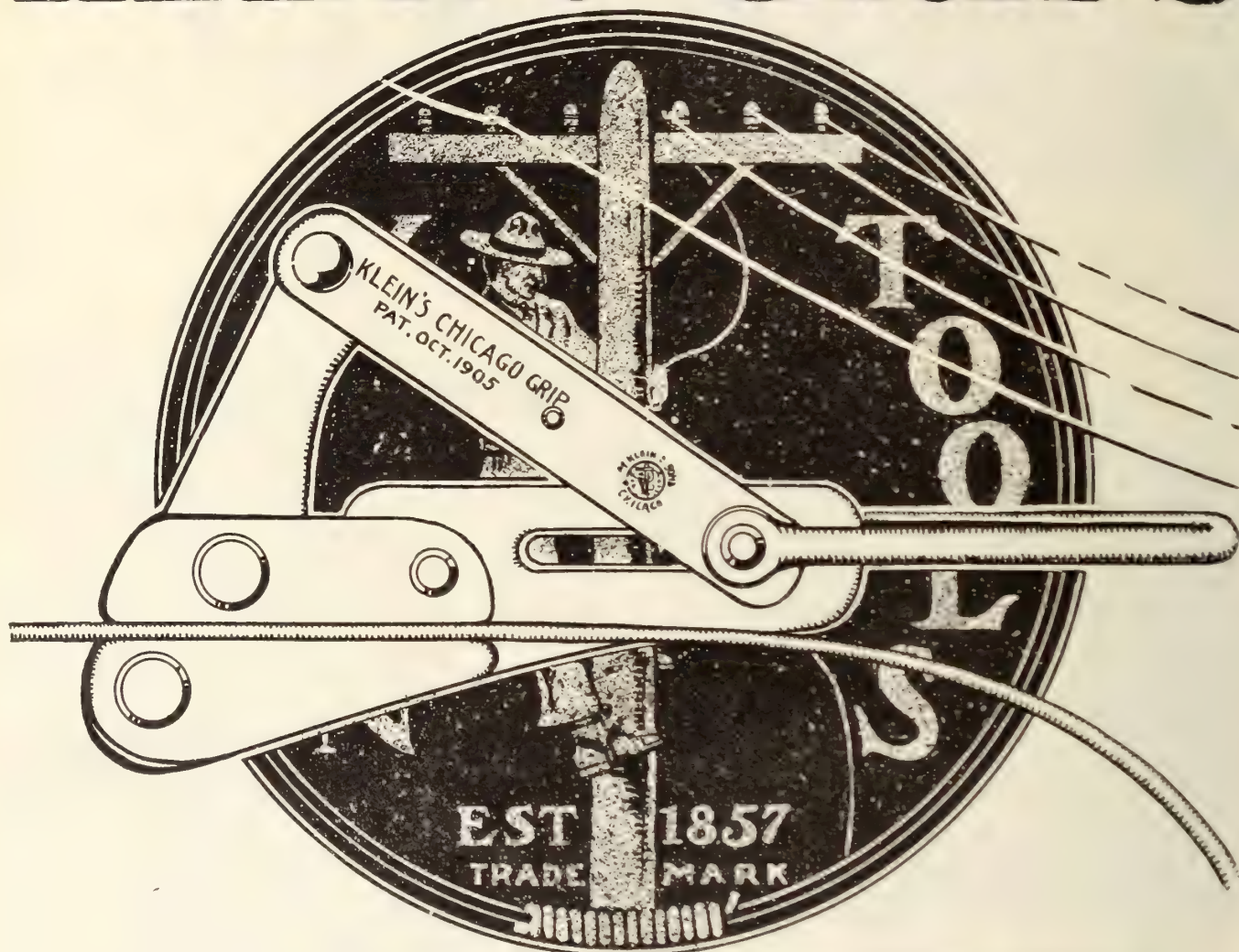


The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

Products: High Tension Porcelain Insulators; Trolley Material; Rail Bonds; Electric Railway Car Equipment; Third Rail Insulators.

KLEIN GRIPS



Are your "trouble gangs" well-heeled with Klein Grips?

Remember, the next four months, with storms, sleet, ice and snow, are the peak months for outside repairs. Klein Grips have been standard for years. They pull straight without putting kinks in the wire, and hold on with the tenacity of a bull dog.

Klein "Chicago" Grips are made from the finest of forged steel, gripping jaws are machine smoothed, rivets are machine turned and the drawing link is so placed that it will not hang down at right angles in the way of the line when the grip is on.

A complete line of Klein "Chicago" Grips, "Haven's" Grips, "Come-Along's", and linemen's tackle purchased now will see you ready for the "trouble months." Look over your stock today.

Mathias KLEIN & Sons
 Established 1857 Chicago, Ill. U.S.A.



A Promising New Field For Electrical Dealers and Jobbers

Wireless telephony has provided a source of rapidly increasing and profitable new business for electrical dealers and jobbers who have taken an interest in it. Amateur operators pay cash for what they buy, and their numbers are growing at a rate which can hardly be appreciated by one who is not in touch with the development of this new and fascinating art.

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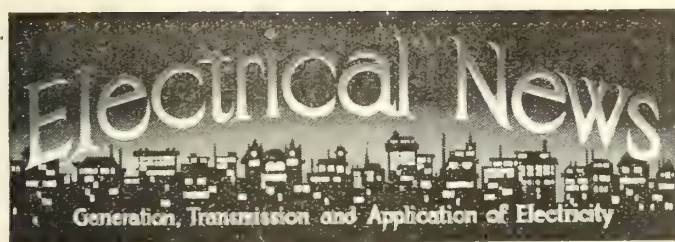
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The "Grand Old Man" of the Electrical Industry—An Appreciation

The foundation of what promises to be the biggest and most essential industry in the world may now, after more than a quarter of a century's labor, be truly said to have become firmly consolidated and, his work being done, the master workman in laying that foundation in Canada has passed to his rest.

A pioneer of pioneers in the electrical field, Senator Frederic Nicholls, throughout his long career, never for one moment ceased to be an outstanding figure in the industry. No other had such confidence in the certainty of ultimate triumph. No other worked with more indefatigable determination to obtain it.

Senator Nicholls' name will always be held in grateful remembrance by electrical men and the appreciation of his splendid work will increase with the years. Any foundation in itself, is, generally speaking, uninteresting and lacking in appeal. It is only when the superstructure is completed and the foundation has proven its reliability that we begin to appreciate its real value; so it will be with Senator Nicholls' work. Who doubts that the foundation he has played such an important part in laying is destined to uphold one of the most magnificent superstructures of all ages. Those who live to view that structure will marvel, indeed, at the foresight of the pioneers who first conceived it.

The late Senator's history is too well known to need repetition. His management for over 30 years of the Can-

adian General Electric Company was one uninterrupted success. His connection with dozens of large Canadian industries; his philanthropies; his hobbies—all these are well known. But of all that has been said of him, there is nothing more true—nothing, we are sure, that would have pleased him so much—as the statement of a lifelong acquaintance, "He never forsook a friend."

It seems a tragedy to our finite minds that just at the moment, so to speak, when Senator Nicholls had decided to withdraw from business activity and enjoy a few years in quiet retrospect and contemplation of the work so well started, he should be called away—but these are matters we do not understand. Up to some six weeks before his death the Senator had scarcely known a day's illness. At that time he was a daily visitor on the golf course pursuing his game with a vigor that was the envy of men half his age—playing as he had worked, with all his might.

Senator Nicholls is gone but his work will bear fruit, cumulatively, through future ages. Every Canadian in the electrical industry mourns his loss and acknowledges with gratitude the heritage he has left behind.

Good Wages and Free Labor

It was pointed out recently by Governor Ephraim F. Morgan of West Virginia, in a statement in the New York Commercial, that 40% of the bituminous coal produced in this country is from mines where non-union labor is employed. He says, in speaking of the leaders of the United Mine Workers: Under the present wage scale they have found it an impossibility to lessen the tonnage from the non-union districts." After a long course of rioting and murder which received countenance or apology from the national leaders, developing into an armed insurrection which only the United States Army could suppress, these mine leaders discovered more than the governor ascribes to them, or at least would have found it if they possessed an intelligent sense of proportion.

They themselves had stimulated the non-union production by the encouragement of loafing, costly labor conditions and excessive wage demands among union workers. The per capita production of the non-union miner is far greater than that of the unionized worker. His labor conditions are eminently tolerable, his net wages are as good or better, and he has practically continuous work against fewer days a week in the unionized districts. When will labor begin to understand that a union is a means and not an end? If the workman can secure better conditions in the open shops of the United States Steel Corporation, is it any wonder that 93% of that corporation's employees were not in sympathy with the indefensible strike of two years ago? To judge from the utterances of some labor apologists, and more particularly those who carry their half-baked economics into the pulpit, a strike is something good for its own sake and a union is an end in itself. Everybody is looking around for signs of better times. The non-unionized miner is one of them, and he is getting big wages at that.—Barron's Weekly

Canada's Finances in Good Shape

Mr. J. H. Gundy was a recent speaker at the weekly luncheon of the Electric Club of Toronto. Mr. Gundy spoke on "Finance" and reviewed briefly the financial condition of the principal countries in the world and the causes that had led, since 1914, to that condition. Speaking more particularly of the depreciation of currency of the various countries, he explained that this was largely a matter of undue increase of paper money. Taking Germany as the extreme example, he pointed out that from time to time Germany had issued more and more paper money, without any gold reserve behind it, until finally the mark was only worth about one seventieth (1/70) of its original value. The logical outcome of this condition would be the repudiation of all this currency by Germany and a start over again on a solid foundation.

In the meantime, however, Germany was producing very cheaply. While it was true that wages were high, figured in marks, yet the increase was nothing like in proportion to the currency inflation. The German workman himself realized the worthlessness of his currency and all over Germany today it has become the policy to turn this currency into a product which has some value; for example, the moment a workman is paid, he will exchange all his wages for coal or some commodity that will not perish. Germany's currency is thus rapidly reaching the point where nobody wants it at any price.

In a general way adverse exchange represented the extent to which any country's currency had been inflated. The United States had not found it necessary to inflate at all, Canada only to a small extent, England to a somewhat greater extent, France still more and so on. Thus it was that exchange between Canada and the United States showed less discrepancy. This discrepancy was rapidly being eliminated.

Mr. Gundy considered that Canada's position, financially, was eminently satisfactory. Of course it was still necessary to spend with caution, but fundamentally we were on a sound basis. During the last fiscal period our exports were 60 odd millions in excess of our imports—a condition unbelievable in the days before the war. It should be one of our chief aims to maintain this condition. Further promising features were the fact that bank loans are now \$200,000,000 less than they were a year ago and our savings accounts—the barometer of the common man's wealth—are \$10,000,000 higher than a year ago.

Defective Casting Causes Accident

Considerable interest has attached in electrical circles to the fatal accident that occurred in the Canadian General Electric Company's plant at Peterboro some three weeks ago, when Mr. Henry Harvie lost his life. Mr. Harvie was at the time of the accident acting as inspector for the consulting engineers, C. H. & P. H. Mitchell, under whose supervision the generator was being constructed for the Nova Scotia Power Commission.

The explanation of the whole matter is summed up in the evidence of the Coroner's jury, which states "that the said Henry Harvie came to his death on Friday, Oct. 14, 1921, by being struck on the head by a piece of steel casting broken from a generator which burst while being tested in the works of the Canadian General Electric Company, Peterboro; and from the evidence we find that the casting was defective; but from the evidence produced we fail to find that accident was caused by wilful neglect on the part of any person or persons.

The casting that was wrecked was made by the Sterling Steel Products Company, of Pittsburgh, Pa., and passed the test of the Pittsburgh Testing Laboratories, acting for the Canadian General Electric Company. The evidence showed,

however, that there must be a defect in the casting. Mr. Peter Westbye, vice-president and general manager of the William Hamilton Co., expressed the opinion that this must be the case. It appeared to him that an unsuccessful effort had been made to correct these defects. An examination after the accident would indicate that an attempt had been made to weld certain cracks that seemed to have developed.

The accident is regrettable from every point of view. Mr. Harvie was well-known and held in very high esteem in the engineering profession. The Sterling Co., who must apparently be held responsible for the accident, was also widely known as manufacturers of thoroughly reliable equipment. Somebody slipped somewhere, however. The incident teaches the same old lesson that eternal vigilance is the price of safety in the electrical industry, as elsewhere.

A. I. E. E. Meeting Announcements

The American Institute of Electrical Engineers, Toronto Section, has announced three meetings. On November 11 the subject will be "Street Lighting". Brief introductory addresses will be given by Messrs. A. G. Lang, W. H. Woods, A. B. Cooper and M. B. Hastings after which Mr. George Cousins is scheduled to compare the lamp units from various aspects.

Recording Instruments

On Friday, November 25, Mr. Manfred J. Johnson, of the Bristol Company, will speak on "Recording Instruments", with particular attention to conditions which are met in design. The automatic recording of quantities and occurrences is a matter of daily increasing importance in all branches of industry; and nowhere has this practice been carried to a higher degree of refinement than in the electrical field. Mr. Johnson is connected with the Electrical Experiment Department of the Bristol Company, whose name has been associated with recording instruments since their inception; so we may be assured of a talk which will give us many new aspects of the subject, and open our eyes to details that seldom come to the attention of those engineers that are not in the "meter game."

Distribution Records and Overhead Distribution

Mr. C. E. Schwenger, of the Toronto Hydro-electric System, will give the second paper in a series of talks on the subject of "Operation and Maintenance", on Dec. 9.

Anyone who has seen Mr. Schwenger's maps must wonder how it is possible to walk two blocks in Toronto without getting hopelessly entangled in a maze of wires and equipment. Mr. Schwenger will explain how he can tell what has been done, is being done, or is likely to occur in this spider web, without taking his feet off the office desk. His system and records will be an eye-opener to those who have not yet had the privilege of studying them.

Electrical Building for U. of T.

A new wing of the Chemistry and Mining Building on the Faculty of Applied Science and Engineering, Toronto, was opened, Thursday, Nov. 3. This wing is to be known as the Electrical Building and special laboratories have been set aside for the study of, and practical experiments in, the various phases of electrical engineering. The building is 220 ft. long by 65 ft. wide. It is an important and valuable addition to the university's equipment.

The R. F. Wilton Electric Company, 124-128 Richmond St. W., Toronto, are distributing a new very attractive catalogue covering their line of fixtures, portables and appliances. The catalogue is very profusely illustrated

Hamilton has Ideal "Home Electrical"

A picturesque home, of beautiful Tudor Gothic; a model in architectural design, harmoniously blended into a perfect setting on the north shore of Burlington Bay near the Hamilton Highway; a home so conveniently and thoroughly wired and equipped for the use of electrical appliances, as to make it practically servantless—such is Hamilton's "Home Electrical."

This Electrical Home has been exquisitely furnished and artistically decorated and illuminated throughout. The interior design is Tudor Gothic, with the exception of the living room which is typical Georgian.

In this Electrical Home, "White Coal" is used for all work of cooks and housemaids. Electric lighting, warming, cleaning, cooking and refrigeration, the five essentials of home comfort, are all available at the touch of a button.

The lighting service enters underground through a tile duct. Lead covered, rubber insulated wire is used for this purpose. A separate transformer to supply the load is mounted on a pole a short distance from the house.

A separate room has been provided for the service equipment, and the control for the water system. Thus all the important equipment is kept under skilled supervision to prevent unauthorized persons from tampering with the same.

Water is obtained from the bay. A motor-driven automatic pump is located in a pump house near the shore. The entire water supply for sanitary, domestic, heating and lawn sprinkling services is supplied from this equipment. The drinking water is filtered separately. A septic tank system of modern design has been provided.

The exterior illumination consists of ornamental lighting throughout the grounds, at the entrance to the house and at the lodge. The servants' quarters and the garage are provided with electric service throughout.

The lighting fixtures were specially designed to harmonize with the interior decorations. An emergency system of lighting, connected to all the main units, with the control on the wall at the head of the owner's bed, provides protection in case of fire, burglary or other emergency. This system was very economical to install. It was only necessary to provide a standard 3-way switch at all points to replace the standard single-pole switch. Where the 3-way is used it should be replaced with the 4-way. The switch at the point of master control is a standard double-pole flush switch which acts as a single pole switch in each emergency circuit.

The total connected load is 35 kw. There are 65 ceiling outlets, 30 sidewall receptacles, 32 bracket outlets, 41 single-pole switches, 2 double-pole switches, 8 three-way switches, 4 four-way switches, 9 electric heater outlets and 5 floor receptacles.

In addition to the usual electrical equipment, which includes all the smaller indispensables such as toasters, portable heaters, percolators, etc., this home has a stationary type vacuum cleaner, an electrically operated refrigerator and a motor driven water pump. The control for the vacuum cleaner, which is located in the basement, is mounted at convenient points upstairs and equipped with a pilot light; vacuum outlets are, of course, provided at convenient points throughout the house. A large domestic type range is installed in the kitchen. Finally, a complete system of intercommunicating telephones provides communication throughout the house, the servants' quarters and the garage.

The important feature about this home is not so much the electrical equipment it contains as that proper facilities were provided with which to operate this equipment. Credit for this splendid result is due Mr. Gordon Hutton, the architect and engineer, Bank of Hamilton Building, Hamilton, and Mr. V. K. Stalford, who designed and supervised the

electrical installation. Messrs. Culley & Breay installed the electrical equipment complete and supplied the apparatus.

Manufacture of Incandescent Lamps

A combined meeting of the Toronto Section of the American Institute of Electrical Engineers and the Toronto Chapter of the Illuminating Engineering Society was held at the C. & M. Building, University of Toronto, on Friday evening, October 28. Mr. E. G. Brownlee, superintendent of the Sunbeam Lamp Company gave an address on "The Manufacture of Incandescent Lamps."

It is rarely one meets, combined in the one individual, such a well balanced combination of technical knowledge and practical experience as was shown by Mr. Brownlee on this occasion. From the most complicated chemical operation intering into the preparation of the necessary materials, to the finest mechanical detail in the factory, he demonstrated a mastery of the situation. The audience expressed appreciation of Mr. Brownlee's invitation to inspect the factory and a date will probably be set for this purpose.

Far-reaching Influence of Ontario Safety League

Mr. J. F. H. Wyse, General Manager of the Safety League has received the following letter from Mr. A. H. Sirks, Chief Commissioner of Police, Rotterdam, Holland:—

"On an exposition at the Safety-museum at Amsterdam, I saw your traffic bulletins No. 17 and No. 28. As Dutch people yet need a lot of education in traffic matters, I should appreciate highly to get in possession of material in this question for policemen's instruction and propaganda (f. i. showing lanternplates in cinemas).

"Will you be so kind as to inform on which conditions I can procure myself different bulletins of your society, as shown on the above mentioned exposition.

"On thanking by forehand for your kindness,

I remain, Dear Sirs

Yours very truly,

A. H. Sirks

Chief Commissioner of Police."

The League is sending the Chief Commissioner a large amount of Safety literature.

Northern Electric Engineering Society

With last year's splendid work in mind, the Northern Electric Engineering Society is arranging a program that will strengthen the very cordial and profitable relations that were established among the engineers of the city. It is the intention of the Society to hear local and visiting engineers on various technical matters. It is believed that no other way affords the same opportunity to exchange ideas that are engaging the attention of engineers as does a society situated as is the Northern Electric Engineering Society. The usual social events will be looked forward to by those who attended them last year. Efforts are being made to arrange visits to industrial plants; a feature of the program that bids well for the heartiest interest of the Society's membership.

At the annual meeting of the Society held a few days ago, the following new officers were elected:—Honorary President, P. F. Sise; President, W. S. Vipond; Vice-President, C. D. Schnebly; Secretary, T. J. C. Heeney; Treasurer, A. H. R. Lanoue; Committee, W. D. Bishop; W. B. Cartmel; N. L. Dann, J. D. Peart.

The \$2,375. tender of Messrs. Harris & Marson, 81A Parkway Ave., Toronto, for the wiring of Rose Avenue School has been accepted by the Board of Education.

Power-Factor an Influence in making Power Rates

By H. W. MEYER.

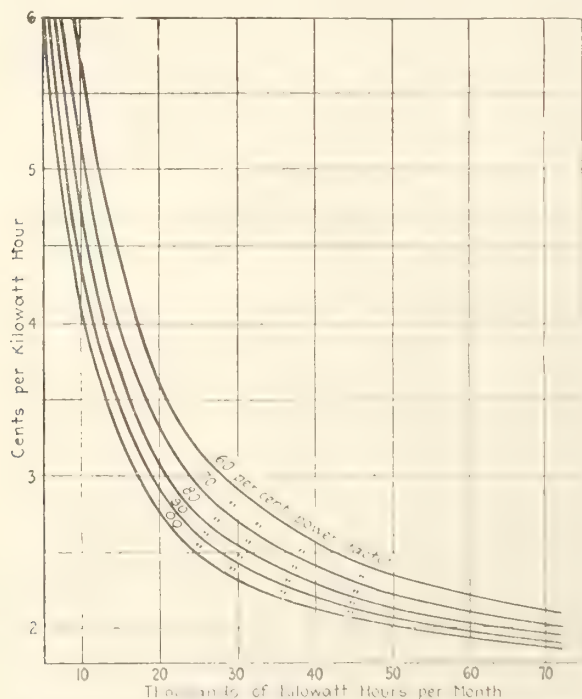
Northern States Power Company, Minneapolis,
in Electrical World

The power factor of the energy taken by a power consumer should in some way be a factor in the rate which a consumer pays for energy taken from the lines of a public service company. Where the power factor is less than unity there is an increase in the capacity of transformers, lines, cables, sub-stations and generating capacity required. Copper losses are increased and voltage regulation is made more difficult. If hydraulic plants are operated on the system, there is a direct loss in the kilowatt-hours which may be generated due to the limitation of the output of the generators because of heating. Such a loss of course, exists only when there is ample water for operating at full load and where the hydro-electric plant capacity is not sufficient to carry the entire load.

It has been proposed to install watt-hour meters so connected as to read the reactive component of the kilowatt-ampere-hours and from this reading and the reading of the ordinary watt-hour meter calculate a power factor which forms the basis of a penalty or a factor to be applied to the power rate.

Some Methods Undesirable

This scheme will, of course, give the consumer with a low power factor an incentive to increase that power factor, but it has certain objections. The power factor which is calculated by this method is not an average power factor, as has been stated. This is true for the reason that the reactive component increases very rapidly as the power factor becomes low. Two consumers may therefore, if the reactive component meter is used, have the same number of kilowatt-hours during a month and the same number of reactive kilowatt-ampere-hours and yet have widely



Curves show rate per kw.h., with different power-factors

different characteristic loads, one of which may be desirable from the point of view of the central-station company and the other undesirable because of poor power factor at the time of maximum demand.

This method of penalizing for low power factors has the further objection that it involves a formula which is not generally understood by the consumers and is subject to errors in calculation. Any rate in which a penalty is provided based on the per cent power factor is objectionable and to be avoided if possible.

For these reasons a different method of taking into account a consumer's power is here proposed which consists of measuring the maximum kilovolt-ampere demand made by the consumer and using this demand in a demand-energy rate in place of the maximum kilowatt demand.

Such a rate is logical inasmuch as the consumer is required to pay fixed charges on the equipment which he makes necessary, plus an energy charge to cover the operating costs in producing the kilowatt-hours consumed.

The objection may be raised that certain consumers will have high power factors over their maximum loads and may have low power factors at light loads. This is, of course, true of certain power consumers using induction motors which are only lightly loaded at times and fully loaded at other times; but the objection is not serious since the most vital factor from the central station company's point of view is the maximum kilovolt-ampere demand, especially if this occurs on the system peak.

A rate of this kind involves no objectionable changes in existing demand-energy rates and at the same time offers an incentive to the consumer to increase his power factor.

The accompanying curves show the rate per kilowatt-hour for consumers having a 100-kw. energy demand and various kilowatt-hour consumptions per month with different power factors. These curves are based on a demand-energy rate of \$30 per kilovolt-ampere of maximum demand per yard plus 1.5 cents per kilowatt-hour. The 100 per cent power-factor curve is, of course, the same as the rate which would be charged if the demand charge were based on kilowatts of maximum demand instead of kilovolt-amperes.

In order to apply such a rate at this time, it would be necessary to install a recording ammeter and a recording voltmeter to determine the maximum kilovolt-amperes for the month, as there is as yet no instrument which will measure directly the kilovolt-amperes in a circuit. Such an instrument can no doubt be devised and would be highly desirable in connection with a rate of the kind which is proposed.

Another Western Opinion on Amalgamation

Calgary, Canada, 1924.

Editor Electrical News.

Your letter of July 25, 1924, on the above subject arrived at the office the day after I left for my vacation and as the same was marked "private," it was not opened until my return a few days ago; for that reason I hope you will pardon what appears to be gross neglect on my part.

I have read your editorial suggesting one big central station association to replace the two associations which now exist covering this field, and in my opinion, your suggestion is timely and very wise. No good reason can be advanced which makes necessary an association grouping the leaders of privately operated electric utilities, and one for those in charge of the publicly owned utilities in the same field. Both parties, no doubt, are putting forth their best efforts for the same end, namely, the supplying of efficient electric light and power service to the people at a reasonable cost. Privately owned companies are putting forth just as great effort to accomplish this end as are the publicly operated plants and while the feeling did not prevail a few years ago between the men of these two classes of utilities, I believe that feeling, because of the better understanding which now exists, has disappeared.

and because of that belief I stated that your suggestion is timely.

If we go back 15 or 20 years we can recollect that those possessing the data with respect to detailed design of the various apparatus then being developed were loath to share it with their co-workers. That day is long gone by and I believe we have to thank for its absence—and the fact that the best engineering data is now available to all—the various engineering associations who brought men together in convention for the purpose of becoming better acquainted, exchanging data, and bringing to light all possible information that had a tendency to improve conditions or service.

As the practice and desire of the engineer to retain to himself information that was of benefit to society is now so long gone by that it is nearly forgotten, so will the desire of the privately and publicly owned electrical concerns to operate within closed doors disappear.

Both privately and publicly owned utilities have but one common purpose in mind, namely, to render the best possible service to the public. I do not think this end can be arrived at better than by having all work together. There is room for both to operate—and I believe, to operate together.

Your suggestion is a good one, and I hope that your efforts in endeavoring to bring all central station men into one organization for the good of the electrical trade will be crowned with success.

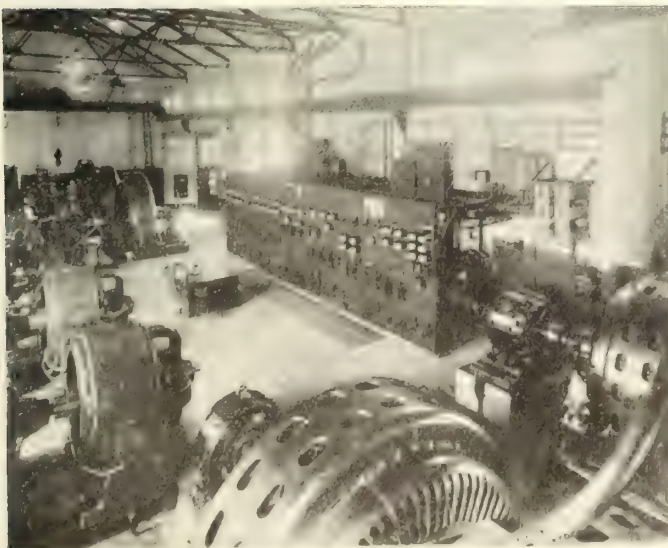
R. A. BROWN,

General Superintendent Electric Light and Street Railway Departments.

Sherbrooke Sub-Station of Southern Canada Power Company

The photograph shows the interior of the hydro-electric station of the Sherbrooke Railway and Power Company, which is controlled and operated by the Southern Canada Power Company, Limited.

The plant, which is situated in the centre of the business



Interior View Sherbrooke Sub-station.

district of the City of Sherbrooke, operates under a head of 54 feet. The water is brought from a concrete dam to the turbine through a steel penstock 10 feet in diameter and 1200 feet long. There are three horizontal turbines, made by the Jenckes Manufacturing Company of Sherbrooke, direct connected to three 940 k.v.a., 2200 volt generators manufactured by the Canadian General Electric Company.

The turbines are each governed by Lombard oil pressure governors, the oil pumps being driven from the main shaft. The exciter capacity for the entire plant is provided in duplicate by two water wheel driven direct-connected interpole exciter units. The high tension lines are brought in through the roof bushings to the electrolytic lightning arresters which are placed in a gallery above the transformer equipment.

Part of the output of the plant is used for the Sherbrooke Street Railway, and this is supplied through 250 kw. interpole d.c. generators, driven by two 2200 volt 375 h.p. induction motors. The remainder of the output is fed by 2200 volt circuits to the manufacturing district of Sherbrooke, and by a 22,000 volt line which supplies the rich industrial and agricultural section between Sherbrooke and the northern part of the State of Vermont. Additional power is supplied to the company's customers in the district by a 48,000 volt line from the Drummondville station of the Southern Canada Power Company which is operated in parallel with the station described herein, and also by a supply of power from the Shawinigan Water & Power Company, through two frequency changers, 30 to 60 cycles, operating in parallel with the Sherbrooke station buses on the 60 cycle side.

Winnipeg Hydro Growing Rapidly

The staff of the Hydro-electric System of the city of Winnipeg celebrated the 10th anniversary of the System on Saturday evening, October 15. The celebration took the form of a Whist Drive and Dance. Mr. J. G. Glassco, manager of the Winnipeg Hydro System, and Mrs. Glassco, assisted by Alderman J. K. Sparling, chairman of the Public Utilities Commission, and Mrs. Sparling, received the guests. Prizes consisted of electrical devices, including a table stove; electric curling tongs; ladies' night lamp; an electric immersion heater and an electric glow heater. The gentlemen's consolation prize was an electric keyhole light.

The Winnipeg Hydro have further celebrated their 10th birthday by the inauguration of the "Hydro News," an interesting little sheet which it is proposed to publish regularly. The object of this publication is pointed out in the first editorial, which states that electrical operation need no longer remain a mystery to the citizens and that it will be the aim of the Hydro News to explain to the citizens the wonderful assets they possess in their municipal hydro system. The bulletin goes on to state that the second extension of their hydro-electric plant is now completed and that the city has a surplus of over 30,000 h.p. available for use by the citizens at large. Another item refers to the second transmission line which has been erected between Winnipeg and the city power plant, both to increase the capacity and as a guarantee of continuity of service.

The development of the use of power in the city of Winnipeg is shown, by figures published in this first bulletin, to have been continuous and rapid. The peak horsepower load in 1912 was 14,000 and in 1921 46,000. The number of customers in 1912 was 18,000, and 1921 45,500.

Remarkable growth is also shown in the sales of appliances. The appliance department was inaugurated in 1917. In the first year equipment to the value of \$26,000, was sold. In 1918 this amount had increased to \$59,000; in 1919, \$103,000 and in 1920 to \$310,000.

This is a fair indication of the direction in which we should look for development in the electrical industry during the next ten years.

Proceedings of the 31st Annual Convention of the Canadian Electrical Association held at Quebec City, June 15-16-17, 1921, are now available in printed form. The office of the Association is at 601 Power Building, Montreal.



Minnedosa Hydro-electric plant, now supplemented by Diesel Units

Combined Hydro-Electric and Semi-Diesel Plant

By J. ROCCHETTI, Chief Engineer Manitoba Power Commission

Minnedosa, which is a town of about two thousand population, is situated a hundred and fifty miles west and twenty-five miles north of Winnipeg, and is a divisional point on the Canadian Pacific Railway.

Some years ago a local company was formed to harness a waterfall on the Little Saskatchewan river, and a hydro plant was installed. An earth-embankment dam about three-quarters of a mile in length was built, allowing of quite extensive water storage, and the development of a head of twenty-five feet. A six-foot penstock led to the power house where a horizontal shaft turbine was connected to a 375-kv.a. generator. The drainage area had not been thoroughly studied and when the plant was put into operation and service started, the company faced the fact that during the winter months no water flowed into the reservoir, so that plant operation was possible only from eight to nine months in the year, and during the season of greatest need—that is the winter months—there was no delivery of power. The company spent a large sum of money in the endeavor to remedy this condition, but finally was obliged to cease operations and go into liquidation owing to the impossibility of financing the utility.

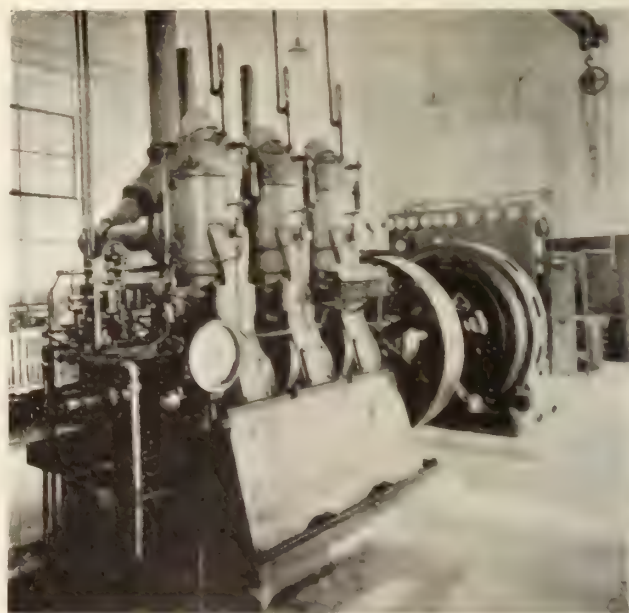
When the town made application to the Manitoba Power Commission for a supply of electric light and power, it was found that, for the present, it would not be economically possible to link the Town of Minnedosa up with the Commission's transmission system, and the only possible solution was to take over the company's hydro plant and supplement it with a new plant.

Taking into consideration the fact that in the southwestern part of Manitoba, and near its border in Saskatchewan there are found quite extensive deposits of lignite, a steam power house was considered. In its natural state this coal is very difficult to burn in the grate, so a study was made of the possibilities of using lignite in a pulverized state. The studies showed, however, that the cost of the process would be prohibitive, and the scheme was abandoned.

The installation of a gas producer plant was then considered, but this was found to be economically undesirable and it was finally decided to install fuel oil engines of the solid injection type, or what is called the Semi-Diesel engine.

To house these engines a new building was designed and erected near the old plant, with extensions to accommodate a re-designed hydro plant when the old one will be dismantled, and to allow for additional Semi-Diesel engines if required. The back of the building is arranged for use as a repair shop and store room.

The power house is heated by means of a small water boiler, installed in the back of the building. Two concrete tanks, having a capacity of six thousand Imperial gallons each, for the storage of fuel oil, were built under the store



One of the Diesel Units Minnedosa Power House.
room. The construction of these tanks was very carefully checked. Waterproofing was mixed with the concrete and when completed the inside walls were coated with special waterproofing solution. These tanks have proved very satisfactory.

Semi Diesel Unit in the Minnedosa Power House.

Company of Chicago, (represented in Canada by the General Supply Company) were selected. The generators and switchboards were supplied by the Canadian Westinghouse Company. The present plant consists of two units, each composed of a 3 cylinder, 2 cycle, 120 h.p., 300 r.p.m. Semi-Diesel engine, direct connected to a 3 phase, 2200 volt, 81.5 kv.a. generator with belted exciter. A leather-belt flexible coupling connects the engine shaft to the generator shaft. This flexible coupling was found necessary due to the fact that the engine and generator are not mounted on one bed plate.

These engines have proved very satisfactory as electric prime movers both for efficiency and for steadiness under variable load. The engines are sturdily built and are so balanced that they could be installed without expensive foundations and still be free of vibration.

The engines are of the hot-bulb type. The oil used, known as fuel oil, has a gravity varying from twenty-six to thirty-six degrees Baume. This latter is used in cold weather, having a better fluidity for handling purposes.

Several special features make these engines very efficient and reliable: The governor is designed in such a way that the governing mechanism holds open the suction valve of the pump for a varying length of time, this being determined by the power requirement of the load. The result is that the function of the governor is sure, and the speed variation of the engine under variation of load is almost nil. This permits a very easy paralleling of the generators. The governor is well illustrated in Fig. 2. The engines are started by compressed air, the air starting mechanism being mounted at the lower end of the governor shaft. Patented oil seal metal packing is directly set in the crank. Inspirators are supplied with try cocks to remove air from fuel line when necessary. The main bearing shells are removable without disassembling the engine. The fastening of the piston pin is accomplished by means of a snap ring in the piston pin bore, so as to prevent the side-way movement of the pin, which often scores the cylinder and is easily removable.

For synchronizing purposes, it was specified that the governor of either engine must be controlled from the switchboard, and a special electric control has been developed, so that the engineer may control the speed of the incoming unit, when synchronizing, without leaving the switchboard. This feature has proved very practical, and as one man only is at any time in attendance, he can, by this means, parallel the generators very easily.

A graphic tachometer has been installed in each one of the engines, and charts are mailed every day to head office where records are kept of the operating features of the plant.

The tests made at the factory test block, in the presence of the writer, gave the following results:

Number of cylinders	3
Diam. of cylinders	12¼ ins.
Length of stroke	13½ ins.
Speed or rpm normal	300
Total weight of engine	18,000 lbs.
Weight of flywheel	2,000 lbs.
No load running I. B. H.	150
Normal output B. H. P.	110
Overload capacity B. H. P.	130
Mechanical Efficiency	80%

Fuel consumption per B. h. p. per hour:

No Load	¼ load	½ load	¾ load	Full load	Over load 20%
23 lbs.	1.00 lbs.	.75 lbs.	.63 lbs.	.57 lbs.	.59 lbs.

Quality of fuel—28° Baume—19,000 B.t.u. per lb. fuel.

Injection water to be used sparingly on ¾ load and quite freely on full load. Cooling water used, total—about 400 gals. per hour, 3.3 per h. p.

Temperature at various periods of running—average 100° F. Thermal Efficiency—27%

Amount and quality of lubricating oil: about one third gallon per hour of Diesel cylinder oil.

Speed at varying loads—as per specification.

Governing, regulation on varying loads—as per specification.

General: Starting equipment and time taken to start—10 minutes. Appearance of engine, painting, etc.—O. K. Steadiness while running full load—O.K. Condition of bearings and working parts immediately after tests—O. K.

The plant is completed with an air compressor driven by gasoline engine, fuel oil pumps driven by electric motor, fuel oil meter and auxiliary fuel oil tank. Water for cooling purposes is taken directly from the water reservoir. Circulating water pumps are belt driven from the main shaft.

The plant was put into operation the middle of March, 1921, and has been in use since then for continuous 24-hour service. The hydro plant has been in use only for about four weeks.

The engines are paralleled every day to take care of the peak load. After two weeks' run the engine is thoroughly inspected. The operating performances have been found to be up to the test performances.

The average fuel oil consumption is about .9 lbs. per kilowatt-hour, with fuel developing approximately 19,000 B. t. u. per pound. For lubricating about five to five and a half gallons of cylinder oil is used per day and per engine, and although part of this is recovered it is not re-used.

No flickering whatever has been observed in the light produced by these engines.

An Electrically Equipped Ship

As is well known, almost the first place where electric light was used was on board ship; and Great Britain led the way in this application of electricity which made life at sea so much more healthy and pleasant. Since the early days when electric lamps and electric ventilating fans were practically the only uses of electricity on board ship, there have been many remarkable developments. In one of the latest liners launched from a British shipyard there is a very complete electrical installation. All water-tight doors are operated and controlled electrically from the captain's bridge. There are two electrically operated lifts for the pantry; and amongst the service machinery there is an electrically driven apparatus for mixing the dough and for washing and peeling potatoes. The electrically driven gear also includes refrigerating fans, ventilating fans, and forced-draught fans for the boilers. The ship's whistle is automatically operated by electric means from the captain's bridge and loud speaking telephones have been installed to assist in the navigation of the ship. Some interesting features are shown by a still larger British ship which recently went on her maiden voyage to America. This large vessel, which accommodates 2,200 passengers, is specially designed and built to burn oil fuel, and her turbines drive the propellers through the latest type of mechanical speed reduction gear. All the auxiliary machinery, such as winches, hoists, steering gear and cranes, is notable for being electro hydraulic, thus representing a notable advance on former practice.

The Onward Manufacturing Co., Kitchener, Ont., announce that they have just opened up a retail branch store in Winnipeg, under the name of Eureka Vacuum Cleaner Company, which will be operated for the sale of the Eureka Vacuum Cleaner and the Sunnysuds Washer. The store is located at 40 Notre Dame Ave. and has been placed in charge of Mr. V. R. Homersham.

The Report of the Commercial Section of the Canadian Electrical Association

Minimum Guarantee Clauses in Contracts—Power and Lighting Sales Bureaus—Stressing Merchandising Methods—Work of Educational Committee—Questionnaire Replies Furnished Valuable Information

This year marks the beginning of a considerable change in the committee organization and work, both of the Canadian Electrical Association and of the National Electric Light Association, as stated in the secretary's report.

However, conditions in Canada differ quite considerably from those existing in the other geographic divisions in the United States. Accordingly, it was felt, in the case of your Commercial Section, that the interests of the Canadian Electrical Association, for this year at least, could best be served by eliminating certain refinements of the committee structure within the N.E.L.A. Commercial Section. By combining the functions of several of their bureaus and committee into one of our committees, it was believed that expense to our member companies would be reduced without any decrease in the actual volume of work accomplished.

Hence, in forming our Commercial Section, your chairman appointed members to represent the Canadian Electrical Association only on the following bureaus and committee of the Commercial Section, N.E.L.A.: Power Sales Bureau, Lighting Sales Bureau, Merchandise Sales Bureau, Education Committee.

Your Section, as a unit, has kept in touch with the committee work of the remaining bureaus and committees of the N.E.L.A. Commercial Section listed as follows: Advertising and Publicity Service Bureau, Electric Vehicle Bureau, Commercial Service and Relations with Customers Committee, Compensation of Salesmen Committee, Electric Salesman's Handbook Committee, Finance Committee.

After holding several meetings throughout the year and being represented by two of its members at each of two of the Executive Committee meetings of the N.E.L.A. Commercial Section, your Commercial Section respectfully reports as follows:—

Power Sales Bureau

Because of the general business depression which began in the fall of 1920, and which only now is showing signs of a return to a more normal state, certain of our member companies have noted a considerable change in the volume of their power sales. Not only has there been a decided lessening in the number of applications for new services, but also a general reduction has occurred in the use of power on the part of existing customers.

This lessening in central station output has come at a time when operating expenses are at the highest level ever known. The consequent reductions in net revenue in some instances have been of serious moment to our member companies, faced as they are with the contract obligation of maintaining their power supply to existing customers during a time of business depression to the same extent as called for during periods of normal usage.

Your Bureau accordingly recommends most strongly for our member companies to give their careful consideration to the subject of **Minimum Guarantee Clauses** in the contracts for power service that come up as renewal of existing business, or as new business. Is the present form of contract such as to afford the revenue required to carry the heavy fixed charges incident to supplying the service nor-

mally demanded, which service possibly under present extraordinary conditions may not be desired by the customer for months at a time? Now that our member companies have made the investments required to supply such service, it is obvious that full justification exists for us to stipulate a sufficient minimum monthly return to cover the full expense of maintaining our service in readiness to supply, regardless of whether or not this service is demanded continuously by our customer.

This necessary protection may be secured in various ways: by a flat rate per horse power per year or by a combined service charge, plus meter rate, with a monthly minimum payment based upon the amount of service contracted for or upon the maximum demand previously established. Your Bureau hesitates to recommend any particular arrangement, but has incorporated later in this report a summary of replies to a questionnaire from many of our member companies, which it is felt will partly answer this question.

Operating conditions on the part of many of our power customers during the past six months or more have been such as to cause unsatisfactory conditions of low power factor on certain of our member companies' circuits. This subject of low power factor operation, however, has been treated quite exhaustively in previous reports to our membership, and your Bureau does not intend to touch upon this important subject further than to recommend that our member companies incorporate suitable clauses in their contracts to guard against such needless operation by their customers. Typical Power Factor Clauses, as used by certain of our member companies, are listed in the questionnaire for the convenience of our members.

No outstanding new development in the line of electric power application has come to the attention of your Bureau during this year.

Several customers of our member companies have installed, and others are now investigating, the merits of electric furnaces for the melting of non-ferrous alloys. The development of such furnaces has progressed steadily during the past few years, and there are now a number of well-known makes on the market, principally used in the production of nickel alloys, brass, bronze, copper, aluminum and platinum. These furnaces are generally of small capacity, about one (1) ton or less per heat, and operate on single phase circuits as a rule, with requirement for from about 150 to 300 Kilowatt per ton of capacity.

Such furnaces are becoming in quite general use in brass foundries, and deservedly so. With their use labor costs are lowered, particularly if the furnaces are supplied with automatic control. Melting costs are a function of the price of power, continuity of furnace heats and of the thermal efficiency of the heating medium. With the present high fuel prices and the reasonable rates for electric service, the melting of brass in electric furnaces will be found to be cheaper for our customers as a rule. Because of the larger melts, as well as the more intimate mixture obtained by the use of electric furnaces, the quality of brass from an

electric furnace is probably more uniformly good than that obtained by the older methods.

Another electric furnace development recently has been the production of malleable iron in a three-phase arc type furnace. The manufacturers of this furnace claim the very important advantages of more correct analyses being obtained; better temperature control; higher yields of better castings; reduced production costs and less skilled attendance required. Your Bureau has no personal knowledge of any installation of such a furnace, but believes, in view of the admitted under-production of malleable iron in Canada, that this process is very worthy of careful investigation, with a view to the possible establishment of such an industry in some one of our centres.

Lighting Sales Bureau

One of the principal features of this year's activities of this Bureau has been the establishing in a number of the larger cities of the United States of a remarkably successful Industrial Lighting Exhibit, designed to educate the public to the economic necessity of adequate illumination. Your Section hopes that this exhibit will later be shown in some of our Canadian cities.

Business depression has partly relieved the serious power shortages that existed in certain sections of the country. This relief has permitted the resumption of display lighting, window and sign lighting, etc., with great satisfaction both to the merchant and central station.

Continued use is being made of the high efficiency lamp, suitably protected by shade or globe to guard against eye strain from undue glare. As in the case of the substitution of the tungsten lamp for the inefficient carbon lamp, the individual use of lighting has been extended sufficiently to counteract successfully the lessened consumption of electricity due to the more efficient illuminant. This type of lamp is now being utilized more and more in the home, due to the smaller size of lamp and to the improved shades that are available now.

The "Day-light" lamp continues its popularity in stores where accurate color matching is required to be made under conditions closely approaching natural lighting values. Its use in the home has not become of any consequence as yet, because of the present high cost of such lamps and their high current consumption per unit of candle power delivered.

With the recent lowered labor costs some of our smaller municipalities are now proceeding to change their existing street lighting installations to the modern type of nitrogen lamp. Your Bureau recommends for all reasonable encouragement to be given to such changes, believing in a small community that no single feature stands out more prominently than a pleasing system of street lighting. Further, it is a fact that the use of modern street lighting educates the people in the community to the value of adequate lighting in their homes, and helps thus to increase the number of lighting customers on the system.

Merchandise Sales Bureau

To counteract the "buying strike" which has been in effect during the past winter and spring, certain of the merchandise managers of our member companies have placed emphasis on the fact that a number of the more popular appliances, electric irons, vacuum cleaners, washing machines, etc., are articles of absolute necessity in the household wired for electricity and in no way should be looked upon as articles of luxury.

Because of the reasonable and necessary price advances of most electrical appliances, their sales have not been curtailed as much as some other lines of merchandise. However, there has been a falling-off in many cases over the average of former years, and certain of our member com-

panies have lessened the burden to the customer on such purchases by adopting a more generous system of deferred payments on the more expensive articles.

A development which may prove of considerable benefit to this branch of our activities is the contemplated investigation by the Harvard School of Business Research into the methods under which electrical merchandising is now carried on. Following the voting of money to defray expenses by the N.E.L.A., the National Association of Electrical Contractors and Dealers, Electrical Supply Jobbers Association and the Electrical Manufacturers' Association, this School plans to secure data from all sources regarding the sale of electrical merchandise and to tabulate the same. The results secured not only will serve to train their students in this industry, but also should assist present men in the industry, as they are to issue pamphlets free to all concerns contributing in any way to the investigation, and at nominal cost to any other interests desiring them.

Your Bureau believes that mention may be made with profit to our membership of the following suggestions that appear as the consensus of opinion of the members of the N.E.L.A. Merchandise Bureau. These suggestions relate to the problem of unloading surplus stocks of appliances which possibly remain on the shelves of our member companies due to the "strike" of the buying public:—

"1. Generally speaking, cutting of prices on standard lists should not be the first remedy.

"2. The resistance of the public to purchasing at present prices may be overcome by a more intelligent and intensive sales effort. The public should be made to realize that the advance in price of electrical merchandise during the past few years has been small in comparison with many other essentials, and marked reductions cannot be anticipated. If sales effort does not suffice, then an analysis of inventory should be made with a view to equalizing stock in co-operation with other dealers. One company may be long on irons and short on percolators. Inquiry among other dealers may find some one long on percolators and short on irons who will be pleased to arrange a satisfactory transaction which will equalize the stock. The same is true of other articles in the list, and inter-company exchange sales may be effected which will prove of mutual advantage.

"3. Again, let us assume there is a supply of irons to turn into cash. It is suggested that the appliance manager offer contractors or dealers in his community an opportunity to buy part of his stock (at a small advance on the original cost price) before the price of a standard article is advertised for sale at a reduced price.

"4. The manufacturer wishes consideration and he is ready to co-operate. The factory representative will gladly help in an equalization process, because he knows stock conditions of the trade in his district. Rather than have prices "slashed" the manufacturer, usually, will take over the surplus stock of the central station dealer. Ask him what he will do to help.

Finally, if none of the suggested procedures bring best benefit will be obtained, however, if the actual satisfactory results, reduction sales are justified. Great conditions of the sale are plainly stated to the purchasing public, and a limited period is made at which cut prices may be obtained. Co-operation with other electrical interests is of paramount importance, and action along the lines suggested will not only create a spirit of goodwill among us, but will likewise have a stabilizing influence in the electrical merchandising business during this trying period of readjustment."

Education Committee

Considerable work has been carried out by your Committee during the year in its endeavor to widen the interest of the various member companies and their employees in the various educational courses of the N.E.L.A.

Representatives have been appointed in each of the larger companies from Halifax in the east to Fort William in the west. These representatives are working hard to stimulate interest in the courses with a view to securing individual and section enrollments.

A considerable amount of success has been attained. In Halifax, seventy-five (75) per cent. of the sales staff are taking up the Power Sales Course. A member company at Shawinigan Falls has formed a section among their salesmen and staff to study the courses, for all of which they have subscribed. This activity will be pushed during the coming year. In Montreal, enquiries are being received for similar purposes.

Favorable interest has been shown by many companies, and, taking all things together, results may be considered as encouraging and the outlook for the future as promising, if the movement receives the backing and active co-operation of the higher officials of our member companies.

To the viewpoint of your Committee it is surprising that more central station employees do not avail themselves of the very excellent opportunities which these courses present of obtaining that knowledge, both practical and technical, which is so essential to their own advancement in the industry they have chosen for their livelihood.

Your Committee strongly bespeaks the assistance of the higher executives of our member companies in the efforts of this, and succeeding committees, to interest the men of our industry in the Educational Courses, being strongly convinced that very marked benefit will accrue to our member companies through the services of a more highly trained staff, and that a higher spirit of loyalty will then prevail.

Questionnaire

To secure information from different sources concerning subjects of timely interest to our membership, your Section drafted the questionnaire below, to which the following replies were received:—

1. **For your power billing do you prefer a flat rate per horse power per year or a mixed service charge plus meter rate?**

Answers:—

The consensus of replies is in favor of a mixed service charge plus meter rate, four (4) member companies expressing preference for this form of rate. Three (3) companies state they use both systems of rate, two (2) of these stating that their smaller power business is carried on a flat rate wherever practicable. One (1) company favors flat rates for all power customers, while another prefers the straight block meter rate.

2. **Do you offer encouragement in the form of special rates, class discounts, or otherwise, to prospective users of surplus or off peak power? (By surplus or off peak power is meant only that power now available, or that is estimated will be available, after all of the requirements of your regular, standard rate customers are fulfilled.)**

Answers:—

Of eight replies, the answers are evenly divided, four (4) each stating that they offered encouragement or did not do so.

3. **If so, will you please advise what notice must be given by you to such users in the event you find it necessary, temporarily, to discontinue this class of service to any customer?**

Answers:—

Of the four (4) member companies encouraging this class of business, two (2) have contract clauses whereby the customer must regulate his load in conformity with the written, verbal or telephone directions of the company; one (1) member company has a clause freeing the company from liability for damages in consequence of failure to supply service at any time or times, and one (1) company evidently has no recourse other than to cancel its contract at its expiry.

4. **Do you employ penalty clauses in your larger power contracts to reimburse for low power factor operation as well as for unbalanced loads on multi-phase circuits?**

Answers:—

Seven member companies state they have clauses to correct for low power factor, while one company as yet pays no attention to this subject. With reference to correcting against serious conditions of current unbalance, no specific clauses are used by any of the companies that answered the question.

5. **If so, will you kindly forward copies of such clauses?**

Answers:—

Two (2) member companies use the following clause:—

"All electrical apparatus made use of by the consumer shall be of good commercial efficiency and such as to introduce no disturbing elements into the electrical system of the company. The minimum power factor of the motors when operating consumer's maximum load shall be as follows: Motors not exceeding five (5) horse power rated capacity, a power factor of not less than 75%; motors of over five (5) horse power and not exceeding ten (10) horse power rated capacity, a power factor of not less than 80%; motors over ten (10) horse power rated capacity, a power factor of not less than 85%. If the power factor be found to be less than the above specified, then the power consumption shall be calculated on the basis of the minimum power factor so specified."

One member company uses practically the same clause, stating that the customer must maintain 80% power factor up to 10 horse power rated capacity of motors and 85% power factor on motors over (10) horse power rated capacity.

Another clause reads:—

"If at any time when power is being delivered to the customer at normal voltage and frequency, the total volt amperes so delivered exceeds that which would result if the power which the customer is then taking were delivered at a power factor of 85%, the volt amperes delivered shall be calculated as power upon the basis of 85% power factor."

One member company states:—

"The minimum average power factor determined monthly shall not be less than 85%."

Another states:—

"If the power factor at maximum K.V.A. be less than 85%, then the total amounts of the accounts due for service under this contract shall be increased by dividing such amounts by the power factor as found and multiplied by 85%."

One member company uses this clause:—

"It is agreed that the rates for service herein provided for are conditioned upon the customer's apparatus taking power at no lower factor than 70%, and should his requirements be such as to cause the power factor in his supply circuit to fall below 70%, then the rates for service herein provided for may, at the company's option, be increased by the amount of five (5) per cent for each per cent the power factor of such service falls below 70%."

6. Do you require power customers on regular contracts to finance in whole or in part the expense of their service connections?

Answers:—

Four (4) member companies require their customers to finance the entire expense of service connection. Two (2) companies state customer must finance this if revenue from proposed service is believed to be insufficient to meet the expense of connection, while the two (2) remaining companies that answered the question state they install all service connections at their own expense.

7. If so, will you please give details, stating whether or not such payment is rebated to the customer during the contract period?

Answers:—

One (1) company rebates payment in some cases at the rate of 25% at the end of each year.

Another company rebates the advanced payment for line construction in some cases in definite monthly proportion of revenue received during the period of the contract only.

One member company writes:—

"We require power customers whose revenue is less than 50% per annum of the cost of connection to pay any expenses over and above twice the annual guaranteed revenue. Expense includes meters, transformers and all secondary distribution work, but no proportion is estimated for primary circuits unless they have to be extended or changed; in the latter case the whole cost of the extension or change will be considered as part of the expense of customer's service. We do not rebate the cost of such extension except in cases where we are not satisfied that the business is a good commercial risk, under which conditions we have asked customers to pay the whole cost of connection, and rebate the excess over the two to one basis noted above through the medium of monthly discounts on power used. We might say that the above applies also to lighting customers, especially rural extensions where we require the customer to advance the whole cost of connection turning over the property to us for maintenance."

One (1) company states they make no rebate at all for their customers' payments for service connection.

Another member company will expend upon a customer's service connection an amount estimated to equal the gross revenue from two (2) years' business.

One (1) company refunds the payment advanced them for cost of service connection out of power earnings, if service has been used for a certain number of years.

8. What security, if any, do you require from short season customers (summer cottagers, etc.) to guard against loss from unpaid accounts, at the end of the season?

Answers:—

Three (3) member companies require heavy minimum charges and a deposit from unknown customers.

Two (2) companies ask customer to pay connection and disconnection costs, also a deposit which is refunded at the season's end.

Two (2) companies require a deposit of \$5.00, while one (1) company requires a deposit of \$3.00.

Your Section in presenting this report believes a comparatively brief report is desired by the membership as a whole, and that discussion upon the matters touched upon herein will be of assistance to clear up points which are sometimes susceptible of different views by various members.

Respectfully submitted this 15th day of June, 1921:
George R. Atchison, Chas. T. Barnes, P. R. Labelle, J. H. O'Hara, M. C. Gilman, Chairman.

Electric Furnaces in Canada

The Department of Mines of the Dominion Government has issued a folder on the metallurgical works of the Dominion, giving a list of the users of furnaces, their types, etc. There is a goodly number of electric furnaces in Canada, in which the following are listed in the folder in question:

Quebec

Armstrong, Whitworth of Canada, Ltd., 298 St. James St., Montreal—1 3-ton and 3 6-ton Heroult electric furnaces.

Canadian Electric Steel, Ltd., Montreal—3 7-ton modified type Heroult three-phase electric furnaces.

Canadian Brakeshoe Co., Sherbrooke—3 2-ton and 1 1-ton.

Canadian Steel Foundries, Ltd., Montreal—1 3-ton.

Thos. Davidson Mfg. Co., Ltd., Montreal—4 6-ton T. D. Mfg. Co., 1 2-ton T. D. Mfg. Co., 1 1½-ton Snyder.

Hull Iron & Steel Foundries, Ltd., Hull—1 6-ton Heroult, three-phase, tilting.

Joliette Casting & Forgings, Ltd., Joliette—1 2-ton Greaves-Etchell.

Shawinigan Foundries, Ltd., Shawinigan Falls—1 5-ton Heroult, three-phase, stationary.

Ontario

Baldwins Canadian Steel Corporation, Ltd., Toronto—10 6-ton Heroult.

Baldwins Canadian Steel Corporation, Ltd., Collingwood—1 3-ton Heroult stationary.

Bowmanville Foundry Co., Bowmanville—1 1¼-ton Gronwall-Dixon.

Canada Electric Castings Co., Ltd., Orillia—1 1½-ton, two-phase, tilting.

Electric Iron, Limited, of Lakefield, Ont., Orillia—1 6-ton, three-phase, tilting.

Dominion Foundries & Steel, Ltd., Hamilton—2 6-ton Heroult, three-phase.

Electric Steel & Metals, Ltd., Welland—1 6-ton basic Heroult, 1 7-ton basic Heroult.

Electro Foundries, Ltd., Orillia—1 6-ton.

Tivani Electric Steel Co., Ltd., Belleville—1 2-ton, 1 ½-ton, 1 1/3 ton.

Turnbull Electro Metals, Ltd., St. Catharines—1 6-ton.

Manitoba

Manitoba Steel Foundries, Ltd., Winnipeg—1 2-ton, single-phase; 1 2-ton, three-phase.

British Columbia

Port Moody Steel Works, Ltd., Port Moody—1 6-ton, three-phase.

Lowox Steel Co., Ltd., Vancouver—1 6-ton, three-phase, stationary.

Opsal Steel Co., Vancouver—1 2½-ton, three-phase, tilting.

Shipton Electric Pig Iron & Steel Smelting Co., Ltd., Vancouver—1 1-ton.

Vancouver Engineering Works, Ltd., Vancouver—1 1-ton Greaves-Etchell.

A tin smelter is also operated by the Electro Tin Products, Ltd., Brantford, Ont., where one Cobb electric furnace of two tons capacity is used.

The McDonald & Willson Lighting Company, Ltd., 309 Port St., Winnipeg, Man., have been awarded the electrical contract on a store and apartment building (being erected) at Notre Dame & Lipton Sts., Winnipeg.

The Cutter Company, of Philadelphia, Pa., announce that Mr. Maxwell B. Cutting, formerly of their Chicago office, has opened a branch at 1418 Chemical Building, St. Louis.



BETTER MERCHANDISING



Where Will the Public Buy Christmas Presents? With the Electric Dealer—or Elsewhere?

Are we, in the Electrical Industry, going to get the Christmas business this year?

Or,

Are we going to let the general public deal with trades that give less value for money received—simply because these trades have mastered the art of salesmanship?

The Christmas business will represent a tremendous volume. It always does, whether times are good or bad. This Fall, however, the feeling of optimism is growing—we feel it in our bones that we're over the worst. If the Christmas sales campaign is properly handled it can be made to cover up a multitude of deficits of the past few months. How shall we go about it?

Here are some suggestions:

1. Stop talking **price**—talk **service**—what your goods will do.
3. **Demonstrate** in your store and windows and in your customers' homes.
4. **Advertise** to reach the public.
5. Be **Salesmen**—not order-takers.
6. Start **now**.

There are two good reasons why low-priced electrical goods should not be sold. First, because Canadians have the money to buy the highest quality; second, low priced electrical goods invariably prove unsatisfactory and react against the industry. The whole idea underlying modern merchandizing is "value received" per dollar of expenditure.

It's not necessary to advance arguments to prove that demonstrations are the basis of "sales." Watch the crowds around the window where one is under way. "Interest" is the first step towards "purchase." In this respect the electric dealers have the edge on every other kind of retailer. We don't take advantage of it as we should.

Back up your service and your demonstrations by telling the people in the daily press, and otherwise, about the things you sell. November and December are the two months of the year when publicity pays unusually big dividends. If your town or city hasn't yet started the "electrical page" get your fellow merchandisers together at once and get into the game. If you feel that you, yourself, can't stand the outlay for a fair sized space, hook up with some of your neighbors and try the "Club" plan. But don't be too skeptical and cautious. When you bought a Victory Bond you didn't expect to have the principal returned within the next day or two—you just expect dividends—5½% in a year's time. That's the way to look upon advertising—it's all investment—it's only different in that it yields bigger dividends.

Finally, let us get down to a working basis by admitting, right at the start, that there are few "salesmen" in the retail end of the electrical business. That's no disgrace, either. We've been "going" only about twenty-five years, while shoe retailers, grocers and others have been in training for about that many centuries. We have reason to be very proud of the progress we've made but that needn't prevent us from making further headway. There's more in retail salesmanship, perhaps, than we think. To wrap up an article for

which a customer comes into our store for the express purpose of buying, is one thing; but to send him away happy with an article, the need for which he had never before been conscious of, is quite another thing. That's salesmanship. In other words, salesmanship is the ability first to create in your customer the desire to possess and second, to convince him of the desirability of possession.

Pacific Coast Province Planning to "Say Merry Christmas Electrically"

They're boosting already for a big Christmas trade out on the Pacific Coast. "Say Merry Christmas Electrically" is the slogan of the British Columbia Electrical Co-operative Association for the holiday season. Mr. Rey E. Chartfield the secretary-manager, sends the following information:

Co-ordinated window display and newspaper advertising will be used to promote the sale of power consuming devices for the Christmas trade.

The Electrical Co-operative Association working with the Vancouver Association of Contractor Dealers will supervise an intensive advertising and merchandising campaign beginning Nov. 7th.

In Vancouver and vicinity the paramount objection in the minds of the public to the use of electric appliances seems to be the cost of operation. This objection is based upon an erroneous conception of the amount of power consumed by such devices. We propose to combat this impression by an educational advertising campaign for a period of two weeks. Showcards will be used, which show average operation cost per week for different appliances under the caption:

"ELECTRICAL APPLIANCES ARE ECONOMICAL TO OPERATE"

For Example: Under the Above Caption We List:

ELECTRIC WASHING MACHINE

Average washing 2 hours per week:

Cost 3 cents per week.

These cost figures were derived from costs published by the Society for Electrical Development supplemented by actual tests made by the B.C. Electric Company. These showcards will be displayed in dealers' windows for the period Nov. 7th to Nov. 19th and at the same time the central station and manufacturers will publish the same information in their newspaper advertising space.

After this two week educational advertising campaign the following schedule will be followed in advertising and window display by all branches of the industry:

Nov. 21 to Nov. 26 Table Lamps.

Nov. 28 " Dec. 3 Washing Machines & Suction Cleaners.

Dec. 5 " Dec. 10 Small Appliances.

Dec. 12 " Dec. 24 General Christmas Suggestions.

During the week Dec. 12 to 17 we will have a co-operative newspaper advertising campaign. By pooling advertising space of individual firms we can obtain larger space in the various newspapers and so more effectively create a demand for electric appliances as Christmas gifts.

During the entire campaign the dealers will follow the general outline of the campaign in their own advertising space and in window display. By this co-ordination of sales effort and advertising, we hope to bring electric appliances before the public in a most effective manner.

Hamilton Electrical Development League Starts a "Do it Electrically" Campaign

All Sections Working Together to Get, for the Electrical Industry, a Fair Share of the Holiday Trade — Plans for "Electric Home," "Children's Contests," "Lighting Demonstrations," and Other Features. Enthusiasm that Spells Success.

The electrical interests of Hamilton, Ont., have plans under way for a "Do it electrically" campaign. The campaign is being arranged and operated under the auspices of the Hamilton District Electrical Association, which is affiliated with the Ontario Association of electrical Contractors and Dealers.

Objects of the League.

The objects of the Hamilton League are outlined as follows:

One. To inform the public regarding the possibilities for correct illumination and convenient use of appliances in the home through proper wiring and location of convenience outlets.

Two. To impress upon architects, builders and real estate subdividers the necessity and advantage of wiring homes correctly and adequately.

Three. To encourage and assist electrical contractors and dealers in developing interest among their customers in adequate wiring for illumination and use of appliances.

Four. In general, to cause all parties concerned in home building to realize that proper provision for the use of electricity in homes is matter of first importance and thus obtain for it the consideration which it deserves, instead of being considered as a question of minor importance, which is at present the case.

A large central committee has been formed in connection with the campaign, composed of representative men in the various sections of the industry. Contractor-dealers are represented by J. Culley, of Culley & Breay, and W. G. Jack, of Jack Bros. Electrical Construction Co.; the jobbers, by J. A. Daly of the Northern Electric Company, and G. Hughes of the Canadian General Electric Company; the manufacturers of electrical apparatus, by G. F. Foot of the Westinghouse Company, Limited; the manufacturers of wire and cable, by G. W. Arnold of the Boston Insulated Wire & Cable Co., Limited and R. M. Dewhurst of the Standard Underground Cable Company, Limited; the central stations, by W. H. Childs of the Hamilton Hydro-electric System, and L. W. Pratt, Hamilton Cataract P. L. & T. C.; engineers, V. K. Stalford, consulting electrical engineer, and E. S. Jefferies of the Steel Company of Canada, Limited; the fixture manufacturers, by W. E. Chadwick, of the Chadwick-Carroll Brass Co. and T. S. Turnbull, of the Tallman Brass & Metal Company; the vacuum cleaner manufacturers, by Mr. T. F. Kelly of the Hoover Suction Sweeper Company, and the electric range manufacturers by Mr. W. Broder, of the D. Moore Company, Ltd.

"Get Together" Electrical Dinner.

Starting the campaign off with a "bang," the Hamilton Association held a big "Get Together" dinner in the Royal Connaught hotel on the evening of November 2. The chief speaker of the evening was M. K. Pike, general sales manager of the Northern Electric Company, who, with Mr. P. F. Sise, president of that company, journeyed from Montreal to be present on this occasion. A number of brief preliminary addresses were also given by district chairmen, including Ernie Drury, Toronto; F. O. Ellis, Kitchener; J. H. Sandham,

St. Catharines; W. Bennington, Stratford; Tom Minnes, Brantford; G. E. B. Gringer, Guelph; W. G. Jack, Hamilton, and W. H. Childs, for the Hamilton Hydro-electric System. These addresses all referred enthusiastically to the progress that was being made in the way of organization and of the satisfactory development of the industry in their locality.

Organization and Merchandising.

Mr. Pike spoke on Organization and Merchandising. He assured his audience that the electrical industry had now reached a point where petty jealousies between competitors might well be forgotten and, in the main, were forgotten. The electrical industry has no time for anything beyond co-operative effort. He believed we did not as yet properly realize the possibilities of the industry—were not yet "sold" on the volume of business available.

Review of Canadian Organizations.

Mr. Pike then outlined, briefly, the extent to which organization had taken place in the different larger centres, in most of which he himself had given a helping hand. First he spoke of British Columbia, and of the splendid co-operative spirit existing in that province, which had given most encouraging results. These results were largely due to the fact that in that province there seemed to be no conflicting interests. They had had two splendid conventions, and an electric show, and had succeeded in placing the electrical idea before the general public in such a way as to increase the volume of business to a very satisfactory degree.

The activities in Manitoba, the Province of Quebec and the Maritime Provinces were also outlined. Ontario was blessed with a larger number of individual associations than were the other provinces and he saw in an amalgamation of these a provincial association including all the varied interests, which should be a most powerful influence in electrifying the homes, factories, stores and offices of this province from one end to the other.

Speaking more particularly of the word "co-operation," Mr. Pike said that the time seemed to have arrived when we must enlarge the meaning of this term. We had looked upon it in the past as referring to the various elements within the industry itself. In future it must be considered as including the public. It was not enough for the industry to be a unit of organization; it was necessary that the electrical industry and the general public should be working together as one unit. At the present time the public had wrong ideas about electricity. They were afraid of the cost of operation, installation and repairs. They were afraid often of their very lives. This latter was largely due to reckless statements in the daily press blaming defective electric wiring for fires or accidents for which electricity was in no way blameable. People must be taught that electrical appliances are safe to handle and that expenditures in electrical equipment give as good value, if not better, than any other purchasable commodity. But before we can educate the people these things must become facts. The responsibility rests with electrical men—they are the only ones who know and they are more keenly interested financially.

The keynote to better merchandising is the contractor-dealer himself. He must develop himself—must become conversant with the methods used by successful business men—must school himself and become as up-to-date as are the merchandisers in other lines of trade who, by hundreds of years of experience, have mastered the art of retailing to a degree not yet approached by the electrical contractor-dealer.

We must have better stores. In the past many of our electrical stores have been merely the headquarters of the wiring gang.

Exit Hardware Stores

We must eliminate all stores that do not specialize in electrical equipment. The hardware man, except in rare cases, treats his electrical equipment merely as a side issue. He has no electrical knowledge—no sympathy with the industry—no facilities for giving service—which, after all, is one of the biggest items in electrical merchandising. Specialized electrical stores must be developed in sufficient numbers to take care of this rapidly developing business.

Mr. Pike then strongly urged the value of window display. He drew attention to the policy of retailers in other lines of business who rented stores in the most expensive localities chiefly on account of the value they placed upon the window displays. These were considered sufficiently valuable to offset in very great measure the abnormally high rents which they frequently paid.

Architects too

Architects must be brought into the co-operative scheme. Their assistance in the matter of influencing the house owner to wire his home properly should be very much greater than it is at the present time. Naturally, the architect does not appreciate to the full the value of ample wiring capacity, numerous convenience outlets, etc. Here again it is to the interests of the electrical industry to place the matter in its proper light before the architectural profession.

Co-Operative Advertising

Co-operative advertising was also urged. Mr. Pike instanced the success attending the national advertising of a number of products that have now become almost household words; for example Sunkist oranges. He mentioned, also, such advertising ideas as Flower Day, Candy Day, etc. Where there was a combined effort to transmit a message to the public as a whole, such effort demanded a minimum of expenditure and produced a maximum of results.

Then we must have electrical shows to educate the public. We must have lighting exhibits where we can actually demonstrate the difference between improper lighting and correct lighting. We must have "Do it Electrically" campaigns periodically.

Relations within the industry

In concluding a most effective address, Mr. Pike referred more specifically to the relationship between the manufacturer, the jobber, and the contractor-dealer. In the interests of the industry at large, a fixed policy regarding this relationship should be determined. If any one element in this group was not performing a necessary function it should be eliminated. On the other hand, if it had been demonstrated that there was no overlapping—that the jobber and dealer were both an essential part in the distribution of electrical equipment to the public—then this fact ought to be universally recognized and a co-operative plan clearly established. He spoke, also, on the question of policy—with reference particularly to cutting prices—of jobbers or manufacturers selling direct to consumers and ignoring the dealer, or manufacturers selling to dealers and the public and overlooking the jobber. This had led to cut-prices, which in turn had led to general demoral-

ization in certain lines of the trade on many occasions. Mr. Pike was decidedly against "fixing" prices but was just as strongly in favor of a fair price covering cost of manufacture and distribution, with a fair profit to all concerned for every article sold.

Tom Kelly Returns Thanks

A vote of thanks was moved by Tom Kelly, sales manager of the Hoover Suction Sweeper Company, and enthusiastically seconded by the audience.

Mr. Louis W. Pratt, of the Hamilton Cataract Power, Light & Traction Company, Ltd., acted as chairman of the meeting—and a delightful one he makes. Mr. Pratt mentioned the fact of Hamilton being the most suitable place in the district for a meeting of this sort, in that it occupied the very site where it was supposed, the cataract, now known as Niagara Falls, had in earlier ages, discharged its waters over the Hamilton mountain.

Ontario Membership Doubled

As a fitting wind-up to an enthusiastic evening, the chairman called on Mr. V. K. Stalford—who, during the last three months had been acting as organizer for the province of Ontario. Mr. Stalford spoke of the hearty co-operation he had received in all the towns and cities he had visited, and reported that the membership of the Ontario Association of Electrical Contractors and Dealers had doubled during the present campaign. Referring more particularly to the work of the Hamilton Association he stated that in the near future they expected to establish an Electrical Home; institute story contests, for which prizes would be given; make special efforts to interest the school children; put on an industrial lighting exhibit and, as soon as proper plans could be made, have a bang-up electrical show. The city had responded generously but a considerable amount of money was still required.

Mr. Pottier, of the Pottier Electric Company, Hamilton, added greatly to the enjoyment of the evening by a number of splendidly rendered songs.

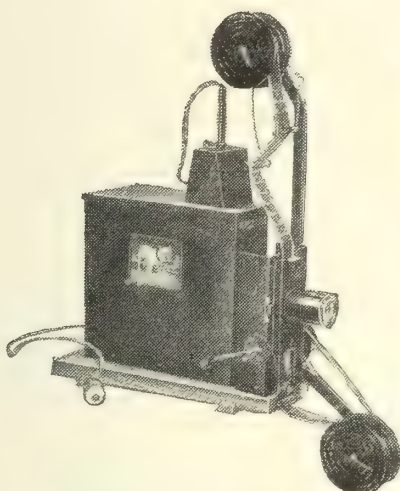
Electric Toys for Christmas

Attractive, Permanent and Educative. They Are Safe for Children—Represent Best Value.

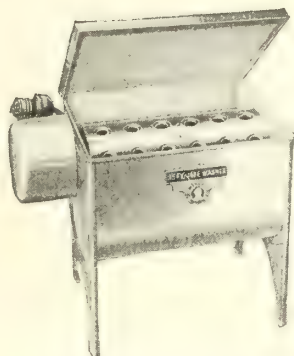
There are toys—and toys. Just because people are buying a Christmas present doesn't seem to be sufficient reason why they should spend money on **useless** toys, and indeed we think it may be taken as a general truth that the average Christmas purchaser would rather buy something **useful** if he or she, could find it at a reasonable price. We all know the experience at Christmas time, however. We have a number of presents to buy, but the utility articles on exhibit simply don't go 'round, so we resort to spending money on things which down in our hearts we know are not worth a cent—toys that go to pieces within the hour—that have no appeal after the first moment of surprise—that have no possible excuse for ever having been manufactured.

Here is where the electrical toy can come in and fill a want. No electrical toys have ever been made up to the present time that do not represent value. They have educational value and they have a dollars and cents value—that is, they continue to operate almost indefinitely. Take toy trains, for example, with all the additional equipment now available. This year also there is a real electric washing machine on the market—a delight to any girl of tender years. There are electric ranges, and so on down the line. The list is not so big as to become bewildering, but it is complete enough to serve a useful purpose. Electrical dealers should not neglect the little folks at Christmas time.

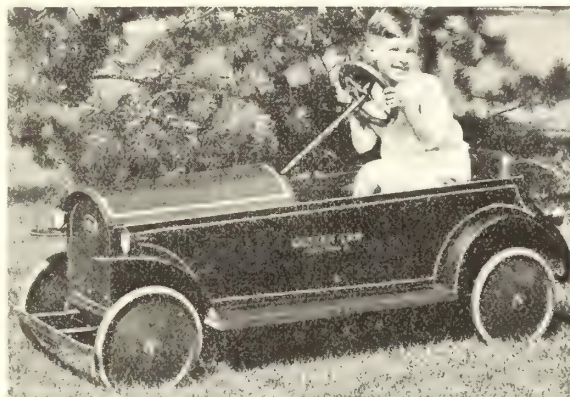
Electric Christmas Toy Suggestions



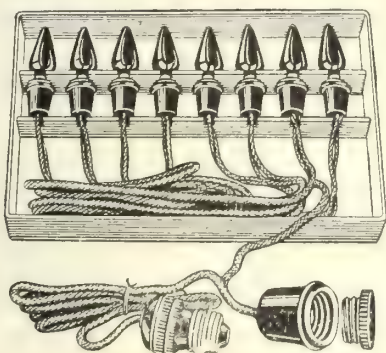
A moving picture machine is a delight to any boy or girl. Here is one manufactured by A. B. Cummings, Attleboro, Mass. Accommodates any size of electric bulb and any current; is air-cooled and easily operated.



Can you imagine anything that would cause a ten-year-old girl more delight on Christmas morning than to find an electric washing machine—just like mother's—in her stocking. Figuratively, that is how big the Jiffy Jeff is. The motor is a new invention, so that this machine can be retailed at a low price. It is big enough to wash handkerchiefs. You can buy this machine from the Jefferson Electric Mfg. Co., of Chicago.



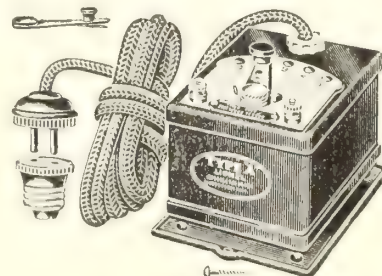
This is a real car operated by storage batteries and has a fair range of travel. It costs more than the average person will pay for a toy, but, on the other hand, there are many people who will pay a fair price for a good article. The Custer Specialty Co. make it and a lot of other similar high class equipment. Their address is Franklin St., Dayton, Ohio.



The centre of the whole Christmas festivities is the Christmas tree itself. But we must eliminate accidents. There are too many fires caused by the use of wax candles. They are a real menace. Let us get rid of them by selling every electric home an electric Christmas tree outfit. Many firms make them. This particular sample comes from C. D. Wood, 441 Broadway, New York.



There are over 600 amateur wireless operators in Toronto. Some of these as yet, are using the simplest toy equipment, but many have already graduated into the larger receiving sets. One dealer reported a customer who spent over \$100 on this equipment for his son and many of them run from \$40 to \$60. The sending and receiving set herewith is manufactured by A. C. Gilbert-Menzies Co.



The basis of the successful operation of nearly all electric toys is the transformer. All electric toys are perfectly safe for children to play with because they operate on low voltage, but this transformer is necessary to produce that voltage. A tremendous number of these have been sold. This particular one is manufactured by the Lionel Corporation, New York.



There never was a boy born who did not want a toy train, and there never was any other train that gave a fraction of the pleasure and satisfaction that an electric train gives. There is no limit to the auxiliary equipment that may be purchased with this train. All electrically operated. Station houses, semaphores, lighting units, switches. Educates and delights at the same time. This is an Ives train distributed by Nerlich & Co., Toronto.

Real Salesmanship Always Wins

Mr. S., an Efficient, Insistent, Courteous Salesman Wins a "Battle Royal" With Mrs. B. Who Was Determined Not to Buy—A True Story With a General Application.

Mrs. B's telephone rang and she hastened to answer it, wondering which of her friends was calling her so early in the morning. To her surprise it was a gentleman's voice—"Is that Mrs. B?" "Yes, Mrs. B. is speaking." "This is Mr. S. of the Blank Vacuum Cleaner Company. I wanted to mention a pleasant conversation I had with a mutual friend, Mr. L., only yesterday afternoon. He is a man for whom I have a very high regard and it is always a pleasure to meet and chat with him. Incidentally, he mentioned that you had one of the most charming homes in the city and a number of electrical appliances. He couldn't recall, however, that you had a vacuum cleaner."

"No, I have never considered buying a vacuum cleaner."

"Well, in any case, it is always a pleasure to demonstrate my machine and I should consider it a favor to have you drop into my store and let me show you what it will do."

"No, thank you, I have no intention of buying a cleaner."

Oh, don't think about that. If you are the least bit interested it would be a real pleasure to us."

"No. Absolutely, no. I am not interested in a vacuum cleaner," and Mrs. B. hung up the receiver without further comment.

Twenty four hours passed and again Mrs. B's morning duties were interrupted by the telephone ringing. A gentleman's voice said "Good morning, Mrs. B.; this is Mr. S. of the Blank Vacuum Cleaner Company."

"Good morning, sir. No, I am not the least bit interested in your vacuum cleaner."

"But, Mrs. B., I should just like-----"

"No, I tell you; please don't bother me again about your vacuum cleaner," and the receiver was again hung up and the second attempt failed.

Another twenty-four hours passed and Mrs. B. was summoned for the third time. There was no sign of irritation or discouragement in Mr. S.'s tone. "What a lovely morning it is, Mrs. B. I just thought it possible you may have been thinking about that sweeper and decided you'd like to see it work. I'm free at the moment and would like to run up in my car. It would only take five minutes of your time. Just mention-----"

By this time Mrs. B. had recovered herself from her indignation, and delivered herself somewhat thus:

"Mr. S., your voice sounds as if you ought to be a gentleman. I've told you I don't want a vacuum cleaner—not your's or anybody else's. Now, frankly, I am not going to be persecuted further about this matter. Do I make myself plain?"

"I'm sorry, Mrs. B.," came the response, "I apologize. I have such great confidence in my machine that I get over-enthusiastic sometimes. Good morning, Mrs. B., and thank you."

Two days passed. Mrs. B.'s conscience smote her just a little. "Perhaps I might have let him come in and demonstrate his machine after all; he was awfully decent about it, but what's the use when I am not going to buy," and she dismissed the matter from her mind. On the following morning, however, the door-bell rang. It wasn't a peremptory ring that raises evil thoughts of vengeance against the collector of old clothes and magazines, but an insinuating, sort of apologetic tinkle that seemed to say "At your convenience, you will confer a favor if you will open the door." And when Mrs. B. did open the door she was met by a pleasant,

gentlemanly "Good morning, I hope I have not called at too busy an hour. I am Mr. S. of the Blank Vacuum Cleaner Company. I had to come up this way to leave a machine with one of your neighbors and couldn't resist the temptation to get a glimpse of the inside of your home; Mr. L. has spoken so often about it."

Unwillingly enough Mrs. B. admitted her visitor, plainly impressed, however, that she was talking to a gentleman.

"Yes," she said, "Mr. L. and my husband are great friends. We are both very fond of him, but he put you on a false scent when he said I wanted a cleaner. I am sorry you have taken all this trouble, because I have not the slightest thought of buying a vacuum cleaner."

"Oh," said Mr. S., "never mind about that; I always carry one with me anyway—for company. This is a handsome rug, Mrs. B. If you don't mind, just for my own satisfaction, I'd like to see if I can't bring those colors up a little bit. I'll promise it won't hurt the carpet in any way, but I've not often had the chance to try my machine on just that particular grade of floor covering. I'll remove this lamp for the moment, if you don't mind, and plug in here. Ah! I see you have a convenience outlet over here. That's fine. Not many people have foresight enough to install these convenience outlets; they add wonderfully to the value of a home, don't they?"

And so Mr. S. chatted on, interesting Mrs. B., whose resistance was still apparent but not so decidedly antagonistic. She wore a decided air of "You'll not find any dust in that carpet," but Mr. S. didn't appear to notice. He connected his cord and commenced to move the sweeper gently over the carpet. As the work progressed, he spoke of the various points of his machine; the lack of irritating noise; its facility in picking up all kinds of lint, thread and whatnot that finds its way into the average carpet. At the end of five minutes he said, "Mrs. B., I wonder if you could lend me a sheet of newspaper; I'd just like to see if it picked anything up." A paper was brought and to the astonishment of Mrs. B. an inconceivable amount of filth was gently shaken out of the receiver.

"What did you bring that dirty stuff in here for? she demanded. "Why didn't you clean that bag before you brought it into my house? Please take it out to the refuse can."

"I'll willingly take it out as you suggest, but I want to assure you that that bag was absolutely empty when I brought it into your house. All that dust came out of your carpet while I operated my sweeper. It's a common experience with us. This machine collects dust that no other known method will remove, and that's why we claim it's more sanitary to clean carpets this way. It's hard to believe, I know, but it's true. If you have any doubt of my word, now that the bag is empty, I'll try it on the carpet in your dining room."

"No, no, no, Mr. S., I really must get back to my work; I should never have let you into the house. However, you asked to be allowed to demonstrate your machine and you have done so. I shall really have to say 'Good morning,' as I am very busy."

Mr. S. made no attempt to detain her further. "I am truly grateful," he said, "for the pleasant fifteen minutes I have spent in your home, but I see you have a number of carpets here, and if you just don't mind being bothered with this machine for two or three days. I am going to leave it. You may feel like trying it somewhere upstairs, or Mr. B. may want to play with it after dinner tonight. I know what men are like—better to keep them occupied when they are in the house. Just as soon as I am around this way again I'll take it out of your way."

"Well, leave it if you like, Mr. S., but I'll guarantee we shan't use it. I am as determined as ever not to buy your

machine. I said so at the first and I ought to know better than you do what I need in my home."

With this Mr. S. was bound to be satisfied. He withdrew with every appearance of cordiality. To all appearance he was perfectly satisfied with the conditions imposed.

The home of Mrs. B. consisted of the father and mother and two daughters, one of whom attended school and the other was employed in office work. All of them realized that the mother's work was less varied—more monotonous and more wearying—than their own, and all were anxious to relieve her. The vacuum cleaner interested them all, but the mother remained firm—she wouldn't have a vacuum cleaner—and she wouldn't let any of them test it out. Dutifully they respected her wishes, and the sweeper was left in the corner where it was placed after Mr. S.'s departure. It chanced that a holiday came around and both the girls were home. Thoughts of tidying and cleaning occupied their minds and the elder daughter said "Now, mother, just let me try this machine once on the dining room carpet; I do so want to see what it's like." After some coaxing the mother gave in. The dining room carpet was cleaned, the bag emptied and the experience during Mr. S.'s visit repeated. "Mother," cried the girls, "look what we got out of this carpet! Why, it was positively filthy; we're going right upstairs to the bedrooms; they won't be so dirty, though, of course." However, the first bedroom carpet gave the same results; an incredible quantity of filth was found in the bag. The work of cleaning, therefore, continued until every carpet in the house had had its share of this novel experience. The girls were delighted; mother non-committal, and the sweeper was replaced in the corner.

Mr. S. was not in a hurry to return to that home. He was a salesman. The first rebuff on the telephone had not been unusual. The second one caused him to realize that he had an unusually difficult problem on his hands. The third one merely deepened his determination to win. He was a fighting salesman—the kind the electrical industry needs. It was fully three weeks before Mr. S. found it convenient to present himself at Mrs. B.'s home. In the meantime the sweeper had been used by the daughters without protest and "father" had added his mild protest at mother's determination to have nothing to do with it. The gentlemanly, tactful persistence of Mr. S. had had its effect, and when he called again he was merely greeted with "Come in, Mr. S., I thought you were never coming back for that sweeper. It doesn't take up much space, though. Here it is."

"Isn't this a most beautiful morning, Mrs. B.? I couldn't resist leaving my car at home so I guess I'll have to leave the machine here till I am up this way again. I thought perhaps you'd been trying it out and might have thought of something you would like to ask me about."

The sequel to the story is plain. Mr. S.'s persistence, tact, courtesy and knowledge of human nature—and of his machine—had won the day. Before he left the house Mrs. B. had consented to keep the machine and Mr. S. had added another advertisement for his product.

Let George Know You're Coming

The Ontario Association of Electrical Contractors and Dealers (Toronto District) are very much alive these days. Another proof is the announcement that their meeting on Friday, November 18, will be Ladies' Night. This date represents the approximate anniversary of the formation of the Association, and the meeting promises to be the most interesting in its history. Keep the special date in mind, **Friday, Nov. 18**, at Bingham's.

Winnipeg Dealer After the Christmas Trade

Much favorable comment has been created in Winnipeg by the very attractive window display being made by the Sibbald Electric Co. Ltd., 601 Portage Avenue.

In a street which is strongly illuminated, the company has produced a very contrasting illuminating effect by the use of an "X-ray" window lighting outfit, which by the use of color screens, throws a solid light of any one of four base colors, and various combination color effects can be had by the use of two or more color screens at one time. This effect immediately arrests one's attention, contrasting as it does with the white street illumination.

A "close-up" view of the window reveals a carefully planned arrangement of appliances, which are in season.

Westinghouse Cozy Glows are given a prominent position, while a handsome mantel, with a Magicoal fire "burning" gives an impression of warmth and comfort as well as being of great selling effect.

It is the policy of the company to change the color effect each week when the window is dressed.

On occasion, the company changes the lighting scheme by the use of vari-colored screens, using the colors of green, amber, blue, and red.

The company is well deserving of the many complimentary remarks which are being made on the whole display.

Manitoba Electrical Association Holds Bowling Tournament and Dinner

On Tuesday the 25th October members of the Manitoba Electrical Assn. indulged in an evening's recreation, in the form of a Bowling Tournament, followed by a dinner held at the St. Charles Hotel, Winnipeg, during which songs were given by J. Milen, and A. Prugh. When the tables were cleared an impromptu program was staged by the inimitable entertainer Art McFayden, who also led a number of choruses. From the manner in which the members responded, one would judge that all thoroughly enjoyed themselves. Fred J. Pratt, chairman of the entertainment committee, who was in the best of spirits, added much to the jollity of the evening by a humorous recitation on topics of interest to those present.

The five highest scores for two games of bowling were as follows;—N. McFarlane, 369; J. Gordon Smith, 367; F. C. Roberts, 335; F. E. Garrett, 331; and R. Taylor, 326. The above winners were presented with five miniature cups, which were generously donated by H. Farley, of the Garry Manufacturing Co.

Electrical Association of Nova Scotia

The Electrical Association of Nova Scotia met for their monthly supper and meeting in the Green Lantern on Oct. 17, with President W. M. Murdock in the chair. About fifty members attended. Each member was furnished with a book containing the constitution and by-laws and lists of members. Mr. Murdock, speaking of this, quoted the first paragraph of the "objects" which speaks volumes. It is as follows:

1. To develop and improve by education, instruction and co-operation amongst the members of the electrical industry the services rendered to the public by that industry.

The chief features of the meeting was an exhibition of films through the courtesy of J. D. O'Conner, chairman of the Board of Censors for Nova Scotia. An interesting talk was also given by Mr. Flemming of Farquhar's Limited, who described and demonstrated the vacuum cleaner his firm is marketing. These demonstrations were witnessed with great interest, and as nearly all those present were directly concerned with selling, they received many valuable

hints for sales talk. Mr. Flemming told of the various kinds of vacuum cleaners from 1900 when they were invented, down to the present day. The latest models beat, brush and draw the dirt out by suction all at once and were shown to be a most valuable accessory to the equipment of the busy housewife. Motion pictures, in a pleasing little drama, told how one man brought happiness to his home by purchasing one of these electrical devices.

Mr. Murdock thanked the gentlemen most responsible for the entertainment, namely Mr. O'Connor and E. A. Saunders who is secretary of the organization.

Making the Most of Your Window

Originality is a Good Asset for the Electrical Dealer —People Look and Listen for Something “Different”

R. A. L. Gray, 85 York St., Toronto, hasn't a particularly central location for an electric store, neither has he a large window that lends itself to decoration and demonstration of electrical appliances. Nevertheless, Mr. Gray considers his window as one of the most valuable members of his sales staff. He uses it to make the people stop and learn about the advantages of the things that he has to sell. Some of the most attractive window displays in the city of Toronto have been staged in the all too cramped window space in the front of Mr. Gray's store.

The illustration herewith is typical. It is different. It concentrates on one idea. It ties in with a well-known nursery rhyme that attracts young and old. Mr. Gray reports that a very large number of people have been interested and stand in front of his window and study his methods.

There is nothing elaborate about the window—that is one of its most attractive features. The whole thing is simply a parody on “The House that Jack Built.” A paper structure represents the house; next in order comes the loaf of bread, then the slice from the loaf, then an electric toaster, then the convenience outlet, then the toast “all hot, crisp and brown,” and, finally, a paper model of a family in a bright, cosy-looking home having breakfast. Each of these items is connected by a ribbon streamer to a card, placed in the front of the window display, and on these cards, in order, are the following legends:

THIS IS THE HOUSE THAT JACK BUILT.

THIS IS THE LOAF
THAT LAY IN THE HOUSE THAT JACK BUILT.

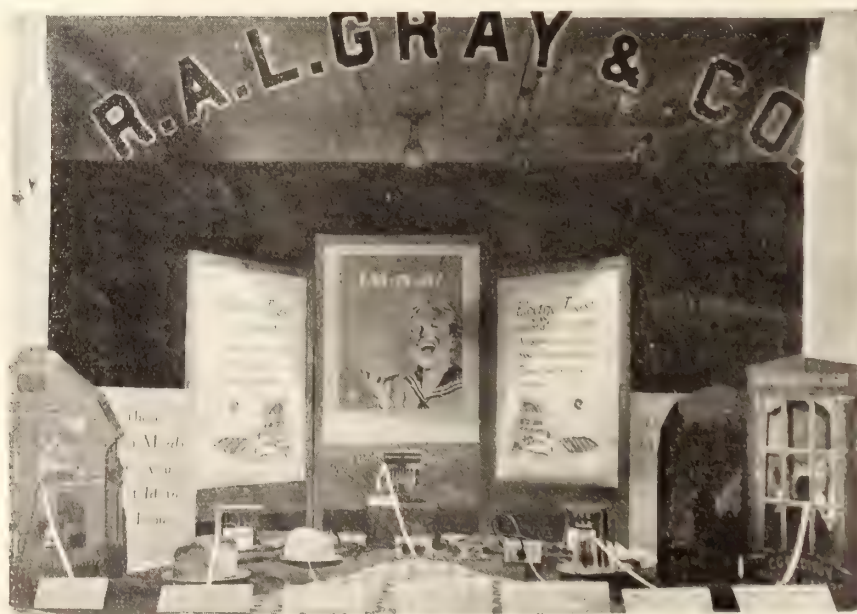
THIS IS THE SLICE
THAT WAS CUT FROM THE LOAF
THAT LAY IN THE HOUSE THAT JACK BUILT.

THIS IS THE TOASTER ALL NIQUELED AND
BRIGHT
THAT TOASTED THE SLICE
THAT WAS CUT FROM THE LOAF
THAT LAY IN THE HOUSE THAT JACK BUILT.

THIS IS THE CONVENIENCE OUTLET ALL READY
AT HAND
THAT PLUGGED IN THE TOASTER ALL NIQUELED
AND BRIGHT
THAT TOASTED THE SLICE
THAT WAS CUT FROM THE LOAF
THAT LAY IN THE HOUSE THAT JACK BUILT

THIS IS THE TOAST, ALL HOT, CRISP AND
BROWN.
THAT WAS MADE ON THE TOASTER, ALL
NIQUELED AND BRIGHT
THAT PLUGGED INTO THE OUTLET ALL READY
AT HAND
THAT TOASTED THE SLICE
THAT WAS CUT FROM THE LOAF
THAT LAY IN THE HOUSE THAT JACK BUILT.

THIS IS THE FAMILY ALL HAPPY AND WELL
THAT ATE UP THE TOAST, ALL HOT, CRISP AND
BROWN
THAT WAS MADE ON THE TOASTER, ALL NIQUELED AND BRIGHT
THAT PLUGGED INTO THE OUTLET ALL READY
AT HAND
THAT TOASTED THE SLICE
THAT WAS CUT FROM THE LOAF
THAT LAY IN THE HOUSE THAT JACK BUILT.



This is the window display that Jack (alias R. A. L. Gray) built and it attracted a lot of people.

Winnipeg getting ready for the Holiday Business—The Electrical Page

The electrical men of Winnipeg are not waiting for somebody else to show them how to run an electrical page and, in general, boost the electrical business. They're leading the way with an interesting, instructive and attractive looking page every Saturday. As might be expected, the Manitoba Electrical Association is behind it. Winnipeg Hydro takes a good sized space, as does also the Northern Electric Company and the Winnipeg Electric Railway Company. A recent issue also contains attractive advertisements by the Schumacher-Gray Co., Ltd., under the trade name "The Electric Shop;" by Burgess Batteries; The Hoosier Store; the National Electric Heating Company and the Time Saver Shop. A useful feature is a printed list of Winnipeg electrical dealers. The editorial contains a number of interesting items. One of these explains the moderate cost of operating an electrical home; a second tells about the electric range, including a number of recipes such as cheese crumpet, drop cake and caramel custard. Another article explains how the electric washing machine is easier on clothes than the old washboard. Then there are items entitled, Electrical Men as Song Birds; Latest Model of Electric Washer; Labor Savers in Offices, etc. Two of the items are particularly interesting, one of them entitled "No Drudge for Mother," might almost have been credited to Walt Mason himself; the other, an electrical parody, was also composed by local talent and sung at the recent meeting when the Kiwanis Club and the Manitoba Electrical Association met in social festivity. We take the liberty of reproducing these two masterpieces.

An Electric Parody

(Tune—John Brown's Body)

Nellie was a housewife; Nellie had to work.

Many duties faced her; these she could not shirk.

Carpets needed cleaning, blankets washing too,

That's why she felt so blue.

Chorus—

Swish goes the washboard; swap goes the broom,

All her muscles aching; Nellie filled with gloom.

She meets her weary husband, who chants his evening song

"How long, O Lord, how long?"

Nellie got discouraged, Nellie nearly died.

Doc. Appliance saved her; he at once prescribed

Vacuum cleaner, cook stove, electric washer, too,

Now work's done—"P. D. Q."

Chorus—

Exit then the washboard, silent now the broom,

The buzz of electricity dispels all the gloom.

Hubby trots home happy; no more work to do,

Finds time to make home brew.

Mother's Growing Younger.

Mother's hands were creased and swollen from long paddling in the suds, washing clothes and pushing irons and much peeling of the spuds and her back was nearly broken working brooms across the floor and for months she hadn't time to even step outside the door. One pleasant summer morning "Dad" hummed a lively air, said he, "It's plain this family ain't treatin' mother fair." He went to an electric store and bought a thing or two he said would make our mother's work just half as hard to do. He carted home a cleaner; mother threw the brooms away, one hour will do the work that used to take all day; the washer "runs by wire" and does its work so fine that laundry day is over now before the clock strikes nine, and mother's growing younger, you can see it day by day, because her work is changed about from drudgery to play.

Sizing up Western Conditions

"Business is extremely good; sales are better this year than last, and the prospects are that next year will be the banner year so far for the company," declared Frederick W. Moffat, general manager of Moffats, Ltd., manufacturers of electric, coal and gas ranges, Weston, Ont., who is spending a few days in Winnipeg.

Mr. Moffat was very enthusiastic about the future, and stated that the factory was working night and day at present in an endeavour to catch up on orders.

On Thursday night Nov. 3rd Mr. Moffat, was host to a number of electrical men at a dinner which he gave in the Royal Alexandra hotel. After a splendid menu had been served, Mr. Moffat gave an informal talk on the company's plant, describing operations, etc. He illustrated his talk with lantern views, and those present were keenly impressed with the thoroughness of workmanship which goes into the Moffat products. Mr. Moffat demonstrated many of the new features of the electric ranges and hot water heaters and with the aid of slides the audience was given an insight into the working of this fast growing Canadian industry. Mr. Moffat showed a number of his own improvements, inventions, and patents which are now applied to Moffat products.

Mr. Moffat intends calling on the western trade between Winnipeg and Vancouver, giving similar interesting lectures, illustrating same with lantern views as he has done in Winnipeg.

"We Don't Take This Christmas Trade Seriously" is Opinion of Well Known Dealer.

Speaking to a well-known dealer the other day, he expressed the opinion that the average electrical store did not take the Christmas business seriously enough. "Over at Blank's department store they double, or treble, their staff. They train the men beforehand in the sale of one special article or one special group. Now if we are going to make a success of the toy business, for example, we have got to set aside a certain space for those toys, place a good salesman in charge and keep demonstrations under way constantly. An electric train that doesn't operate, that gets stuck on the way around, that you have to make excuses for, is a bad advertisement. If we, as specialists, can't make an electric train go, the customer naturally concludes that his own boy of ten would not be able to do so. We don't take the matter seriously enough."

Method of Figuring Overhead

By REY E. CHATFIELD

Secretary-Manager British Columbia Electrical
Co-operative Association.

The contractor-dealers in the electrical trade are slowly coming to a realization of the fact that they are in a legitimate business and that in conducting a business certain cost of maintenance and organization expense must be borne by the sale of their service and merchandise.

This expense is termed in accounting circles as "overhead" and this cost is made up of such items as rent, cost of management and the like; or we may more fittingly call this a cost of conducting a business, which cost is of vital importance to the contractor-dealers.

Methods of arriving at some percentage of gross sales or gross annual business to use as a basis for covering this cost of doing business or "overhead" in determining true cost, are varied. One easy method, however, that is accurate in determining this overhead on a percentage basis is as follows:—Add the annual amounts spent in maintaining the business organization; the sum so determined is the annual overhead expressed in dollars and cents; this amount bears a definite relation to the gross amount of business for the same period. The various items that go to make up this overhead may be segregated as follows:—

1. Rent.
2. Salaries (for management of the business and non-productive labor.)
3. Heat.
4. Light.
5. Water.
6. Telephone expense.
7. Automobile expense.
8. Office expense (stationery and office supplies, magazine subscriptions, stamps, telegrams, etc.)
9. Advertising.
10. Association Dues.
11. Insurance.
12. Workmen's Compensation.
13. Taxes.
14. Interest on investment.
15. Depreciation on tools (replacements brought on by wear and tear.)
16. Depreciation on merchandise.
17. Depreciation on automobile.
18. Allowance for bad debts.

To illustrate the method of handling the figures these accounts would show, assume the amounts under these headings to be \$5,000. Now assume the total business or gross sales to be \$20,000 for the year, the overhead bears the following relation to the gross business:

$$\begin{array}{r} 5000 \quad 5 \quad 1 \\ \text{— or — or — or 25\%} \\ 20,000 \quad 20 \quad 4 \end{array}$$

Thus the cost of doing business, or the overhead, is 25% of the gross business of the year. Bear this in mind when pricing a job or an article of merchandise for resale.

To Determine True Cost

To determine true cost with the figure just obtained as a basis, use the following method: To the wholesale cost add the freight and cartage on a given article of merchandise; to this add the charge for duty, if the article requires that duty be paid; this gives the net cost. Divide the net cost by the difference between 1.00 and .25 which is .75. The "1.00" signified 100% and the ".25" the 25%, just obtained above as the cost of doing business or the overhead. The quotient obtained by this division is the true cost. To illustrate

this:—Cost f. o. b. shipping point, plus freight and cartage, plus duty (if any), equals net cost to you. For example assume:

The cost f. o. b. shipping point to be	\$4.00
Freight and cartage to be	.58
Duty	.40

Net cost to you\$4.98

To determine true cost: Divide \$4.98 by .75 and the quotient 6.64 is the true cost of the article. To this true cost must be added that amount which the dealer deems proper for his profit.

The principle involved in determining cost of doing business applies equally well to the contracting end of the electrical business.

Salesmen

There never was a time when all of us were so solicitous of and solicitous for our salesmen.

Never were they of such importance as to-day and sad to say, never were we more fearful of them, more anxious for them or watched them more closely, even going so far as to remember them in our prayers.

I don't mean that the real salesmen are not making good. They are, but we folks—all of us—are making out that all men selling goods are by no means real salesmen.

A man being chased by a dog runs just a bit faster than he knows how, or than he would if running for exercise.

The dogs are loose and our sales forces are doing some trotting if they are functioning at all.

A lot of men have fallen down on the test. They were overrated; they were sunny-day workers, lacking grit for the day of trouble. A lot have turned out exactly otherwise, having been underrated.

Be he a good or fair or worse artist in salesmanship, the man of the grip has lots to learn as well as a lot to teach, particularly the jobber's salesman, who is too free to confess that his lines are so varied he cannot know the fine points of them all.

In days like these it well behooves the jobber's salesman, or any other for that matter, to dig in a little deeper and see if there isn't just a bit more room in his think-tank and hours in the day for a better knowledge of the lines he sells.

A bit more contemplation and the study of sales strategy may well take the place of the pool room and movie show in the evening program. Even the best of us can start going to school all over and learn many new and advanced things about how to get business when business does not throw itself at us as a year or so ago.

There are four so-called devils that have been described as haunting salesmen in the past. They are no longer worrying a good salesman.

We quote:

(1) "No use trying to see your first man before nine-thirty—got to give him time to open his mail." And if you so much as waver for an instant, he straightway devours the front-end of your precious morning.

(2) The next little begging devil's idea of a reason why you should not work: "It is now a quarter to twelve," he adroitly starts. "If you see a man now he's likely to go to lunch any minute, and he'll hustle you through to get rid of you and get out." If you agree to this proposition, he waits until he gets you comfortably seated at luncheon, or in a hotel lobby, and then suggests: "You can't see him before two o'clock now—he won't be back from lunch." And before your very eyes he gnaws two and one-quarter perfectly good hours right out of the middle of your priceless day. And maybe, too, he nibbles off the half-hour between two and two-thirty, by way of dessert, before he leaves.

(3) At the first suspicion of a shadow that crosses the afternoon light of the autumn days, a third little devil, lean and ravenous, accosts you. "It is getting dark," he mournfully chants, "you can't start a new talk now. Your man won't be in a mood to listen." And before you know it, he has gobbled the entire end off your afternoon.

(4) The fourth little devil feeds only after long intervals. His food is Saturdays. "You can't do anything on Saturdays," he says. "It is a short day and they're too busy to listen." And so, without even allowing you to start out, he swallows your Saturday whole.

And the terrible part of it is that they're such plausible little devils.

If you don't watch out you'll find yourself accepting their say-so as the gospel truth.

But they're liars—every one.—Trumbull Cheer.

Sales Not Half Bad

"How did you find business this morning?" the editor casually remarked the other day to a well-known equipment salesman, who sat down beside him at lunch. "Sh-h," replied the salesman, "touch wood...I'm almost afraid to say it for fear something falls on me, but, truly, sales are not half bad. A lot of the other boys say the same thing. Looks as if we'd really turned the ner."

We predict this spirit will have a cumulative effect—nothing succeeds like success.

Christmas Lighting for the Modern Store.

With the coming of the Christmas season the shop keeper appreciates more keenly the value of proper store lighting in promoting the sale of his merchandise. The persons who are saying "What shall I buy for Christmas?" are naturally drawn to the well lighted store. The season itself suggests brightness and light, for this is the true spirit of the holidays. Now, if ever, is the time to push a commercial lighting campaign in each city and town. The merchants are quick to realize the value of good lighting, and the direct bearing it has on his sales. New, efficient units—like a well-tailored suit on a man give an air of substantial prosperity. That is one reason why a demonstration



so often means a sale. Select one of the many shapes of glassware and wire a fixture with extension plug and hook. Then you can go to your prospect's store and make an easy demonstration without disturbing his wiring.

To show good lighting is to sell it. Your prospect will be impressed with the restful light produced, the added efficiency over his present equipment, and the handsome appearance.

The unit shown herewith is a Cora Lite a product of

the Consolidated Lamp & Glass Co, for which Mr. R. E. Davis, 113 Wortley Road, London Ontario. is Canadian representative.

A Lusty Two-Year Old

Two years ago on November 7th, 1919, the Diamond State Fibre Company of Canada, Limited, started business in Canada at 455 West King Street, Toronto. The rapid growth of the business soon necessitated moving and more commodious quarters were located at 235 Carlaw Avenue. Here, with up-to-date manufacturing, office and shipping facilities they are in a position to execute and deliver all orders efficiently and promptly. In the showrooms there is a wonderfully comprehensive collection of Diamond Fibre products which demonstrate to prospective buyers the many purposes for which fibre can be used. This company states that fibre, both as raw material and in the shape of manufactured products is becoming more and more used in the electrical, automotive, textile, railway and industrial manufacturing field. It is gratifying to find a young Canadian company taking a prominent part in supplying this demand.

They also report that in oil refineries, oil well plants, pulp and paper mills and other large industrial concerns where pump valves are extensively used, the old style pump valve discs are gradually being discarded in favor of those manufactured from Condensite Celoron. Being a vulcanized fabric material, water and oil proof, of a dense mechanical structure, tough, fibrous and non-absorbing, it is claimed to be far superior to any other material for this particular purpose.

Leaving Northern Electric

Mr. W. Murdock, who has been with the Northern Electric Co. for some twenty-five years in the various capacities of production, installation and salesman and who for the last nine years has been manager of the Halifax office of this company, has resigned. We understand Mr. Murdock



Mr W. Murdock

has not yet decided upon his plans for the future. In the meantime his address will be P. O. Drawer 531, Halifax, N. S. Mr. Murdock is president of the Electrical Association of the Province of Nova Scotia which has been doing such excellent work in the organization of the electrical industry in that province.

Electric Railways

Latest Trolley-Bus Development--Actual Tests only can Decide Real Value of This Type of Car

During the recent past the Packard Motor Car Company has made several very successful demonstrations in Detroit, Michigan, of a trolley bus, using electrical equipment furnished by the Westinghouse Company.

During the demonstrations, which were of necessity of a preliminary nature, as only a limited amount of double contact overhead was available on the Municipal Railway Company's right-of-way, the trolley bus was operated at various speeds up to approximately 23 miles per hour. The acceleration of the vehicle proved to be very smooth and rapid. It was capable of operating at a high rate of speed, even though the center of the vehicle was over ten feet to the side of a point directly beneath the contact wires. The ease with which the vehicle could dodge large trucks directly in its normal path, or draw up to the curb to receive or discharge passengers, was astonishing.

While ultimate service with the trolley bus would undoubtedly not include turning around without a loop, it was very gratifying to note that it was possible to make a complete turn of the vehicle, or to "Y" the vehicle in the same way that an automobile or gas bus is turned on a narrow street. During this operation it was only necessary to shift the trolleys once, a method of operation heretofore thought impossible with two trolley poles, but a feature



Fig. 1—The Trackless Bus Complete

which is extremely advantageous in the case of an emergency, such as might occur due to a fire or a similar street blockade.

Design Follows that of Gasoline Vehicles

Contrary to the design of previous vehicles of this class, the Packard Trolley Bus follows gasoline bus design rather than street car design. The body is set comparatively low and is arranged to seat 25 passengers with considerable space available for standees. The bus which is now on demonstration has a floor approximately two inches higher than the floor of the safety car and two steps are provided; however, the construction is such that the floor can readily

be lowered several inches and a single step used. The body is approximately 24 feet long and 8 feet wide.

The complete vehicle including trolleys with 18 foot poles as shown in Fig. 1, weighs 11,500 lb., of which weight 6770 lb. is carried on the rear axle. The chassis is of standard Packard type ED design with such omissions as are necessary to accommodate electrical instead of gasoline equipment. The propulsion equipment consists of two 25 h.p.

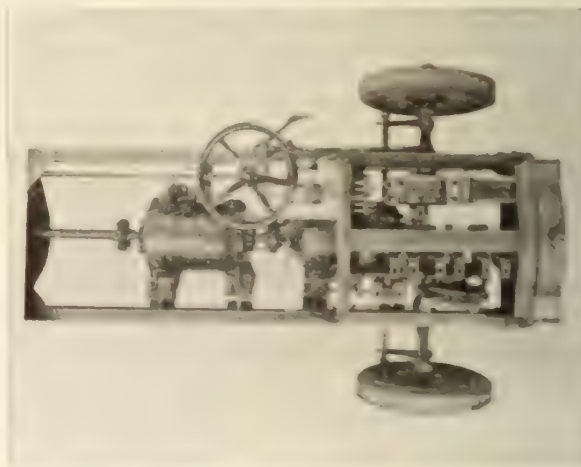


Fig. 2—Propulsion Arrangements

Westinghouse hall bearing safety car motors mounted in tandem and coupled together and to the propeller shaft with flexible couplings. This arrangement as indicated in Fig. 2 lends itself to the use of a low floor vehicle and yet provides accessibility to and the easy removal of equipment in case of necessity.

The front axle is drop forged and has an "I" cross section. The steering knuckles are of the inverted yoke type. The rear axle is a built-up structure arranged so that the weight of the vehicle is carried on heavy steel tubes fastened to the housing. The torque of the propulsion motors is transmitted through the propeller shaft to the worm with a total gear reduction from the motor to the wheels of $7\frac{3}{4}$ to 1. The worm, which is mounted directly above the worm-wheel and the differential, are mounted as a unit in a cast steel carrier bolted in place in the center housing of the axle. The axle drive shafts are arranged so that they transmit torque only and do not carry any of the direct load. Tubular radius rods remove driving strains from the springs. The service brake consists of two contracting shoes operating on a single drum at the rear of the transmission. The emergency brake consists of two sets of internal expanding segments acting on steel drums on the rear wheels.

The wheels which are equipped with special rubber cushion tires are 34 inches in diameter, which diameter results in a free running speed of the bus of approximately 22 miles an hour, with a gear reduction of $7\frac{3}{4}$ to 1.

The chassis complete with motors, control apparatus and resistor weighs 1100 lb., there being almost an equal distribution of weight on the front and rear axles. It is interesting to note in this connection that even though rather

heavy motor suspension castings are employed, the electrical equipment which has a normal rating of 50 h.p. and is capable of developing extremely heavy torque at slow speeds, weighs approximately 175 lb. less than the gas propelled engine equipment for the same size chassis.

Foot Control Is Employed

The control equipment is of the foot operated type and

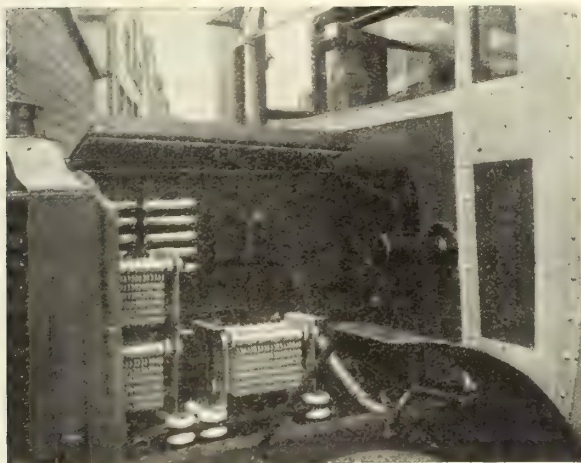


Fig. 3—Appearance of Gas Car Retained

is arranged for automatic acceleration. The notches are provided on the foot controller so that it is possible to arrest the controller at a slow or "switching" speed for travel in dense traffic or at the series or half-speed position. On account of variations in tractive effort required, a unique control operating scheme has been devised. The unusual grade and load conditions to be met may necessitate that some accelerations be made at double the normal accelerating tractive effort. A small motor driven sequence switch controls the operation of the resistance notches as well as the transition from series to parallel while the speed of this small sequence switch motor is directly affected by current in the propulsion motors.

The control apparatus includes two small electrically operated line switches, complete with overload trip, six small resistance and transition switches, a foot controller,

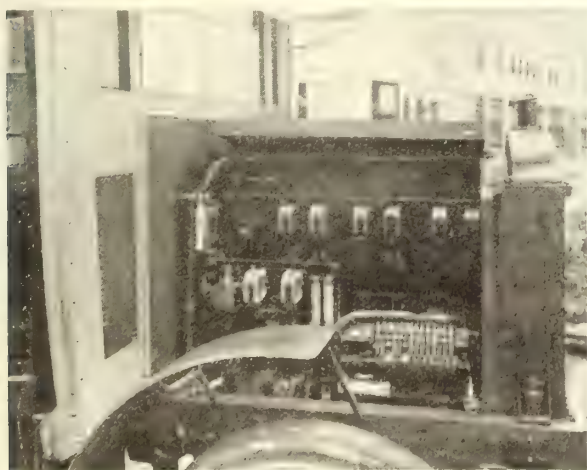


Fig. 4—Control Equipment in the Hood

a manually operated reverser, a motor cutout switch and a set of starting resistors. All of this apparatus is mounted beneath the usual engine hood, the resistors being mounted on the side of the center line whereas the circuit interrupting devices and other important control items are located on the other side where they are ventilated, yet protected

from the weather, as shown in Figs. 3 and 4. The partition dividing the hood into two compartments is of a heat resisting insulating material which acts more or less as a switchboard for the control apparatus. The reverse lever and overload reset lever projects through the dash at a point convenient to the driver.

Nothing has been said so far regarding the current collecting device and while the "final answer" is not yet available, the equipment on this bus has performed phenomenally well. It consists of two separate wheel trolley bases with 18 foot poles, swivel harps and 5 inch diameter trolley wheels having U shaped grooves. The trolley bases are both mounted on the longitudinal axis, one 30 inches back of the other, the front base being elevated 10 in. above the rear base. This arrangement with the running board approximately 11 ft. from the ground, permits of a comparatively large "cruising radius."

What the Tests Indicate

The preliminary test runs to date indicate:—

(1) The desirability of having ample motor capacity for comparatively high rates of acceleration and a free running speed comparable with the speed of other city transportation vehicles.

(2) The advantage of a foot control having a single

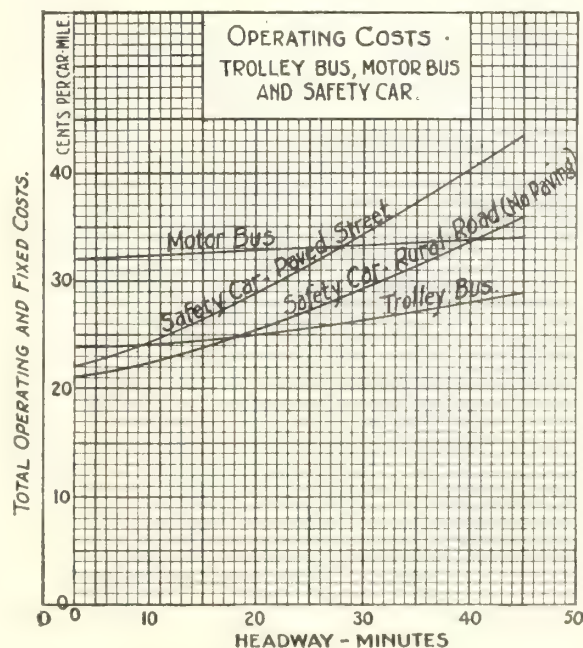


Fig. 5—Comparative Operating Curves

simple motion from the off to the full speed position. In this way the operator can give his entire attention to the driving of the vehicle and has both hands available for steering.

(3) The importance of efficient brake equipment.

(4) That electrically operated trackless vehicles appeal to the public as a bus, and they should be designed along bus lines.

(5) That the economical field for the trolley bus appears greater than formerly presumed.

(6) That the major problem in the development of this form of transportation for the average city lies in the selection of the proper overhead construction and in the development of suitable collecting devices.

(7) The importance of immediate standardization of the distance between contact wires so as to avoid non-interchangeable vehicles and unnecessary development.

Probably one of the most discussed questions relative to trolley bus operation is the "economical field."

There are many elements that enter into a question of

this sort, some of the more important are the following:—

- (1) Existing transportation available.
- (2) Are rural or paved roads involved.
- (3) Density of passenger traffic.
- (4) Condition of existing roads.
- (5) Yearly tax burdens for buses.
- (6) Labor and material costs.
- (7) Power equipment available.

We all realize that the taxicab or "service at call" vehicles, the gas bus, trolley bus, safety car or double truck car, all have an economical field and in order to obtain a picture as to the field of the trolley bus let us make some assumptions and then compare the transportation of human freight by gas bus, trolley bus and safety car.

Possibly the best comparison would be obtained if we compare the total fixed charges and the operating cost per car mile as a function of the number of seats supplied per hour; however, if we assume the gas bus and the trolley bus to seat 30 passengers and the single end safety car to seat 35, and make comparison between total fixed charges plus operating expense per car mile plotted against headway in minutes, we get a very interesting picture.

Schedule speed	10 m.p.h.
First cost of motor bus	\$7000
First cost of Trolley Bus	8000
First cost of safety car,	6250
Mile of city paved single track,	50,000
Route mile of city paved double track,	90,000
Mile of rural improved single track,	30,000
Mile of single 4-0 trolley construction,	3,700
Mile of double 4-0 trolley construction,	5,000
Cost of 200 foot siding	3,500
Mile of 4-0 feeder	610
Conducting transportation (cents per car mile)	7.3
Power cost of safety car (cents per car mile)	2.5
Power cost of Trolley Bus (cents per car mile)	2.5
Gas and oil (cents per-mile motor bus)	6.0
General and miscellaneous expense	
(cents per mile for all vehicles)	4.0
Interest and taxes calculated at	7%

Maintenance per car mile follows:

	Gas Bus	Trolley Bus	Safety Car
Track or road way .. \$0.01	\$0.01	.....	\$0.019
Other way and structures .....	.0105	.....	.006
Vehicle or car .....	.106	.05	.015
Depreciation as follows:			
Life of vehicle	5 years	8 years	12 years

The curve, Fig. 5, of necessity involves many assumptions and is only approximate, yet the tendencies are self evident—For instance:

- (1) The cost of gas bus operation does not decrease materially as density of service increases.
- (2) If safety car tracks are laid on a rural or improved road, the safety car ceases to be more economical than the gas bus if the headway is materially increased beyond 40 minutes.
- (3) Trolley bus or safety car service is fundamentally more economical than gas bus service for frequent service due to cost of gas and high maintenance of gas engine equipment.
- (4) Railless vehicles show up to advantage due to practically free use of roads, whereas rail vehicles must maintain rails and also maintain a portion of the street.
- (5) Safety car transportation not involving street paving expense is more economical for service where the headway is less than 17 minutes. If paving burdens are imposed on the vehicle running on rails its economical field may be materially reduced.

Only actual trolley bus service will tell the real story as there are many unknowns that cannot be evaluated at present. It is hoped that the time is not far distant when all the facts will be known.

Electric Railway Information

A review of electric railway problems of 1921 has been issued by the Westinghouse Electric & Manufacturing Company in Special Publication 1644. This publication is profusely illustrated as an aid to the discussions on mass transportation, multiple-unit control, recent railway motor development, possibilities in interurban service, the value of freight haulage, snow fighting, automatic sub-stations, the place of the safety car, the field of the trolley bus, replacement of obsolete equipment, maintenance of electrical equipment, and many other subjects. Vol. III, No. 1 of Electrification Data has also been published and is being distributed. This issue treats of the Economics of Railroad Electrification, and includes a portion of the progress report made by the Superpower Survey to the ex-secretary of the Interior. Several railroads are mentioned, including the Norfolk & Western, New York, New Haven & Hartford, the Erie Railroad, the Grand Trunk Railroad, the Chicago, Milwaukee & St. Paul Railroad.

Trough Has Been Passed

"The trough of the business depression has, very clearly, been passed. The volume of manufacture halted its abrupt decline in February; prices of important commodities, such as copper, tin, lead, rubber, and cotton, have recovered after a long period of weakness, and of late unemployment in general has slightly decreased. These facts do not mean that business is not depressed, but rather that we are rising out of the trough and beginning an upward swing.

"In other words, the depressed condition of business, which has gripped agriculture, farming, and manufacture, is clearly registered by most of the available indices. If conditions in Europe were more nearly normal, and there were no possibility of a railroad strike in the United States, we could confidently count upon the continued improvement."—Harvard University Committee on Economics Research.

Because

One step won't take you very far, you've got to keep on walking;

One word won't tell folk who you are, you've got to keep on talking.

One inch won't make you very tall, you've got to keep on growing;

Because

A constant drop of water wears away the hardest stone;
The constant gnawing Towser masticates the toughest bone;
The constant cooing lover carries off the blushing maid;
And the constant advertiser is the one that gets the trade

The Mechanical Trades, Ltd., 54 University Ave. Toronto, has been awarded the contract for electrical work on a \$70,000 school being erected at Todmorden, Ont.

B. C. Electric Railway Company have ordered ten new one-man Safety cars for use on its lines in Victoria, B. C. The order was placed with the J. G. Brill Company, Preston, Ontario.

The Westinghouse Electric & Manufacturing Company have issued the following catalogues: Leaflet 3665, illustrating and discussing motors for elevator service; a small folder, No. 57, vest-pocket size, illustrating type LC crane safety switches, folder 76 showing a catalog which suggests insurance against loss by stocking common renewal parts; leaflet 1732, devoted to enclosed float switches, and leaflet 1590 on electric motor drive for power pumps.

Current News and Notes

Acton, Ont.

A new hydro shop, carrying a full line of electrical appliances, etc., has been opened at Acton, Ont., under the supervision of the Acton Hydro-electric Commission.

Amherstburg, Ont.

Messrs. Harris & Marson, 81 A Parkway Ave., Toronto, have been awarded the electrical contract on a new High School being erected at Amherstburg, Ont., at an estimated cost of \$65,000.

Barrie, Ont.

A system of electrical alarms has been installed in the banks of Barrie, Ont., by which the fire alarm and a bell near the bank can be rung in case of a hold-up.

Dunkirk, Sask.

The Bishopric & Lent Co., Cincinnati, Ohio, are establishing works at Dunkirk, Sask., for the manufacture of sodium sulphate. The power plant has been purchased. A C. G. E. generator will be operated by a Peerless engine of 125 h.p. capacity with 150 h.p. boilers.

Glace Bay, N. S.

Mr. J. A. Donovan, 7 Margaret St., Sydney, N. S., has secured the contract for electrical work on Central School, recently erected on MacLean St., Glace Bay, N. S., at a cost of \$400,000. He has also secured the electrical contract on a \$75,000 addition lately built to the St. Josephs R. C. Hospital, Glace Bay, and on a new theatre on Union St., erected a short time ago for Mr. J. A. McDonald, Glace Bay, at an approximate cost of \$45,000.

Guelph, Ont.

G. E. B. Grinyer, Electrical Contractor-dealer of Guelph, Ont., was recently awarded a prize in a window dressing contest. The window display was shown in the Oct. 15, issue of the Electrical News.

Hamilton, Ont.

The Dominion Power & Transmission Co., Hamilton, Ont., has made application before the Civic Street Railway Commission for a straight five-cent fare.

The Electrical Supply Co., Ltd., 65 James St. S., Hamilton, Ont., has secured the contract for electrical work on a \$20,000 bank building being erected at King St. E. & Wentworth Ave., Hamilton, Ont., for the Dominion Bank. Also on a \$300,000 Nurse's Home recently erected at Barton St. E. & Euclid Ave., Hamilton.

Mr. John Dynes, Prospect Ave., Hamilton, Ont., has been awarded the contract for electrical work on an addition being built to the Main Street bank of the Royal Bank of Canada, Hamilton, Ont.

Mr. T. J. Murphy, 241 Robert St., Hamilton, Ont., has been awarded the contract by the Separate School Board for electrical work on an addition being built to the school at John & Ferry Sts., Hamilton, Ont.

Kingsville, Ont.

Messrs. Harris & Russell, who recently started an electrical contractor-dealer business in Kingsville, Ont., have been awarded the electrical contract on a new business block to be erected on Division Street, Kingsville, for Dr. Keiller.

London, Ont.

Mr. E. V. Buchanan, manager of the Public Utilities Commission, London, Ont., will receive tenders for the laying of hydro wires underground in the downtown district. No closing date set. Prices are also wanted on conduit and cable.

The Knowles Electric Co., Talbot St., London, Ont., have been awarded the contract for electrical work on a warehouse recently erected in that place for Crane, Ltd., 88 Terauley St., Toronto, at an estimated cost of \$55,000.

Montreal, Que.

The Phillip Lahee Electric Co., 3 St. Nicholas St., Montreal, has secured the electrical contract on a \$200,000. store and office building being erected at St. Catherine St. & City Hall Ave., Montreal, for Mr. Geo. Rabinovitch, 532 St. Lawrence Blvd.

The Vincent & Say Electric Co., 344 Union Ave. Montreal, has secured the contract for electrical work on the Alexandra Hospital, Charron St., Montreal, which is undergoing alterations. Also on an addition being added to the General Hospital, Dorchester St., Montreal.

North Bay, Ont.

Messrs. McCall & Stewart, North Bay, Ont., have secured the electrical contract on a \$20,000. garage being erected on Main St., North Bay, for Mr. A. Girard.

The Electric Supply Co., North Bay, Ont., has secured the electrical contract on three store buildings recently erected on Main St., North Bay, for Mr. J. Ferguson.

Oakville, Ont.

Mr. B. E. Sprowl, Oakville, Ont., has secured the contract for electrical work on an addition being built to the Allan Street School, Oakville, at an approximate cost of \$30,000.

Ottawa, Ont.

The Salisbury Electric Co., Ltd., 34 Toronto St., Toronto, have secured the electrical contract on a store building on Sparks St., Ottawa, Ont., that is being altered and enlarged for the L. R. Steel Co., Ltd., at an estimated cost of \$30,000.

Outremont, Que.

Messrs. Normandeau & Dery, 115 Bienville St., Outremont, Que., have secured the contract for electrical work on a \$28,000. apartment house being erected at Fairmount & L'Epee Sts., for Mr. W. H. Larue, 1649 Hutchison St., Outremont, Que.

Petrolia, Ont.

It is proposed to install electrically driven pumps in the Lake Huron pump house, Petrolia, Ont. The firm of James, Proctor & Redfern, Ltd., are the engineers in charge of the work.

Sandwich, Ont.

The new police telephone and signal system of Sandwich, Ont., was put in operation recently. Red lights, controlled from the police station, have been placed in different parts of the town with which to signal the policemen on their beats. The cost of the system is understood to be about \$7,000.

Shawinigan Falls, Que.

Mr. J. A. Gignac, Shawinigan Falls, Que., has been awarded the contract for electrical work on a fire station being erected on Champlain St., Shawinigan Falls, Que., at an approximate cost of \$50,000.

Thetford Mines, Ont.

Mr. J. A. Lajoie, Thetford Mines, Ont., has been awarded the contract for electrical work on a \$35,000. hotel being erected at Thetford Mines, Que. for Mr. Salmon Hebert, of that place.

POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 652, Electrical News, Toronto. 17-1f

Chief Electrician, age 35, technical education, 16 years practical experience industrial plant maintenance and construction. Location immaterial. P.O. Box No. 6, Thetford Mines West, P.Q. 21-22.

An unusual money making opportunity is offered salesmen now calling on the electrical trade or industrial plants. It will cost you nothing to investigate. Address 824 Monadnock Block, Chicago. 21-22.

MOTORS WANTED

Several Electric motors; 5 to 25 horsepower; 550 volts, 25 cycle, 3 phase; Westinghouse preferred; for own use. Box 705 Electrical News, Toronto. 22.

FOR SALE

Largest electrical and storage battery business in Northern Saskatchewan. Annual turn-over \$80,000.00

Apply 319, G. North,
Saskatoon, Sask.

Road Work in California Costing \$300,000 Weekly

A bulletin recently issued by the California Highway Commission states that expenditures in connection with state highway construction are now exceeding \$300,000 per week. "The recent sale of highway bonds," the bulletin states, "has

permitted the inauguration of a construction program involving a rate of expenditure in excess of that during any previous period of highway construction."

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In Stock for Immediate Delivery

100 h.p., 3 ph., 25 cyl., 550 volts, 710 r.p.m.
75 h.p., 3 ph., 25 cyl., 550 volts, 480 r.p.m.
60 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
52 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
50 h.p., 3 ph., 60 cyl., 550 volts, 970 r.p.m.
50 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
35 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
30 h.p., 3 ph., 60 cyl., 220 volts, 1150 r.p.m.
30 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
30 h.p., 3 ph., 25 cyl., 550 volts, 1100 r.p.m.
25 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
20 h.p., 3 ph., 25 cyl., 550 volts, 1420 r.p.m.
15 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
15 h.p., 3 ph., 25 cyl., 550 volts, 720 r.p.m.
15 h.p., 3 ph., 25 cyl., 550 volts, 1450 r.p.m.
13 h.p., 3 ph., 25 cyl., 550 volts, 700 r.p.m.
12 h.p., 3 ph., 25 cyl., 550 volts, 1100 r.p.m.
12 h.p., 3 ph., 25 cyl., 550 volts, 1450 r.p.m.
12 h.p., 3 ph., 25 cyl., 550 volts, 725 r.p.m.
12 h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
10 h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
8 h.p., 3 ph., 25 cyl., 550 volts, 750 r.p.m.
8 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
8 h.p., 3 ph., 25 cyl., 550 volts, 1400 r.p.m.
8 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
2 h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
1 h.p., 1 ph., 25 cyl., 110 volts, 1420 r.p.m.
1 h.p., 1 ph., 25 cyl., 110 volts, 1100 r.p.m.
1 h.p., 1 ph., 25 cyl., 110 volts, 1460 r.p.m.
1 h.p., 1 ph., 25 cyl., 220 volts, 710 r.p.m.
1 h.p., 1 ph., 60 cyl., 110 volts, 1700 r.p.m.
1 h.p., 1 ph., 25 cyl., 110 volts, 1460 r.p.m.
1-6 h.p., 1 ph., 60 cyl., 110 volts, 1150 r.p.m.

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Street Cars For Sale

The Toronto Transportation Commission will receive tenders for the following 340 single-end city service street cars:—

<u>Group</u>	<u>Number</u>	<u>Description</u>
A	4	18' Single Truck Closed Motor Cars
B	2	20' " " " " "
C	15	21' " " " " "
D	117	22' " " " " "
E	30	23' " " Convertible Motor Cars
H	1	27' Double " " " "
J	1	30' " " " " "
K	12	25' " " Closed " "
L	34	30' " " " " "
Q	3	36' " " " " "
T	2	16' Single " " Trailer " "
U	33	19' " " Convertible " "
V	69	22' " " Closed " "
W	17	18' " " " " "

340

The single truck motor cars are mounted on Blackwell, Curtis and Peckham trucks and are equipped with G.E.67 and G.E.1000 motors, K-10 controllers and hand brakes. The trailers are mounted on special trailer gear.

The double truck motor cars are mounted on Curtis and Brill trucks and are equipped with G.E.80, G.E.67 and G.E.1000 motors, K-6 and K-10 controllers and Magann storage air brakes.

A stock of spare equipment is carried for the above cars and will be disposed of to parties purchasing the cars. The wheel gauge of the cars is 4 ft. 10 $\frac{7}{8}$ ins.

These cars are now in Toronto and can be inspected upon application to the Head Office of the Commission, Ryrie Building, Toronto, Ontario. Tenders will be based on the cars being loaded by the Commission on their siding in Toronto.

Tenders addressed to the Chairman, sealed and endorsed "Tenders for Street Cars" to be delivered at the Commission's Office, Room 219 Ryrie Building.

The highest or any tender will not necessarily be accepted.

Toronto Transportation Commission

229 Yonge St., Toronto, Ontario



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Motors in Stock

- 25 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 25 hp. C.G.E. 750 rev., starter, rails, pulley.
- 1 10 hp. T.H.E. 1500 rev., starter, rails, pulley.
- 1 10 hp. C.W. 750 rev., starter, rails, pulley.
- 1 5 hp. C.W. 1500 rev., starter, rails, pulley.
- 25 CYCLE, 3 PHASE, 550 VOLTS, SECOND HAND
- 1 25 hp. Ball bearing 750 rev., starter, rails, pulley.
- 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
- 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
- 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
- 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
- 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
- 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
- 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter
- 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
- 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
- 80 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
- 3 ½ hp. 1200 rev. clutch type T.H.E.
- 1 1 hp. 1800 rev. split phase Peerless.
- 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs., capacity. New
- NEW SINGLE PHASE MOTORS in STOCK—REPULSION
- 2 2 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
- 2 2 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
- 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
- 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
- 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1500 rev.
- 6 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
- 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
- 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE
- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev
- 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
- 4 ¼ hp. Menominee 110 volt, 60 cycle, 1800 rev.
- 4 ¼ hp. Ohio 110 volt, 60 cycle, 1800 rev.
- 4 ¾ hp. Menominee 110 volt, 25 cycle, 1500 rev.

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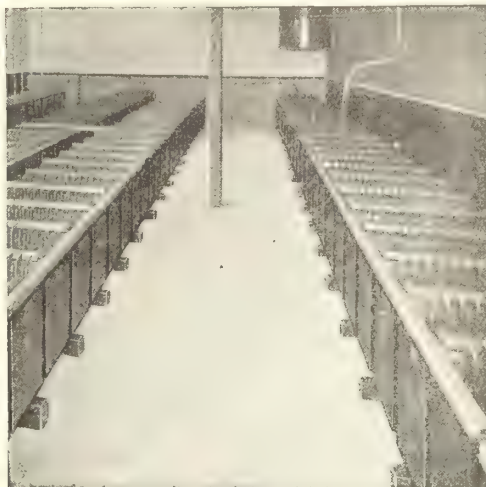
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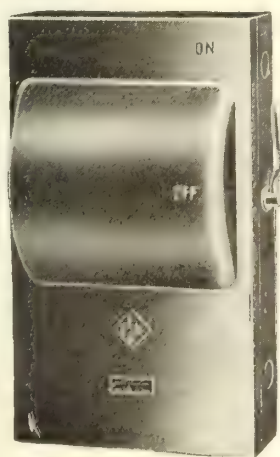
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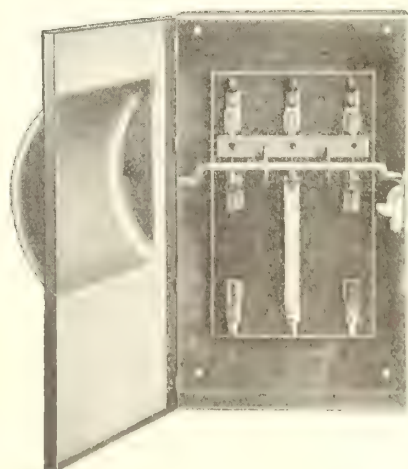
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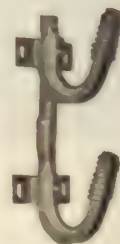
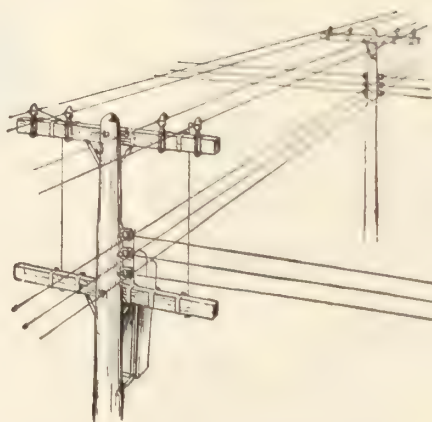
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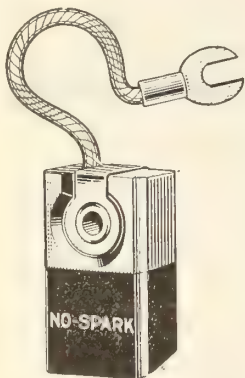
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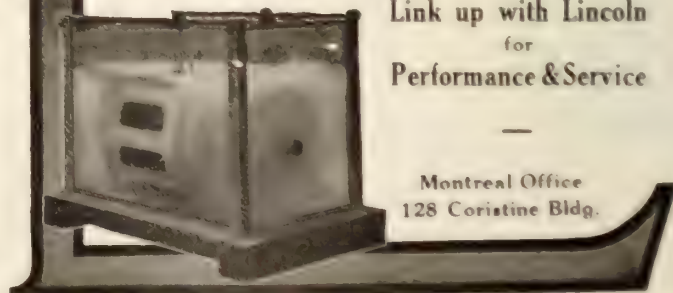
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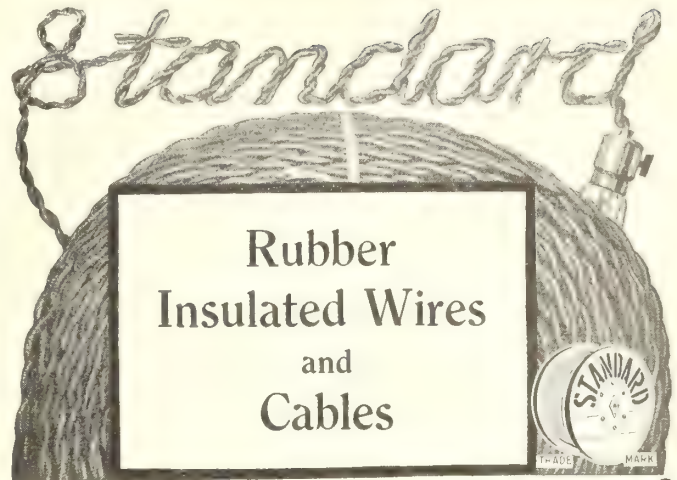
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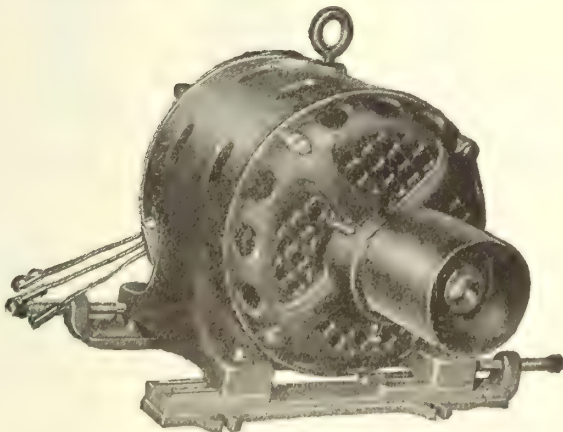
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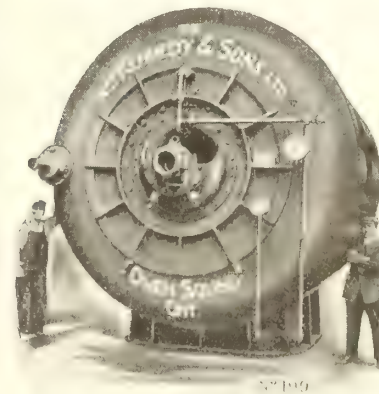
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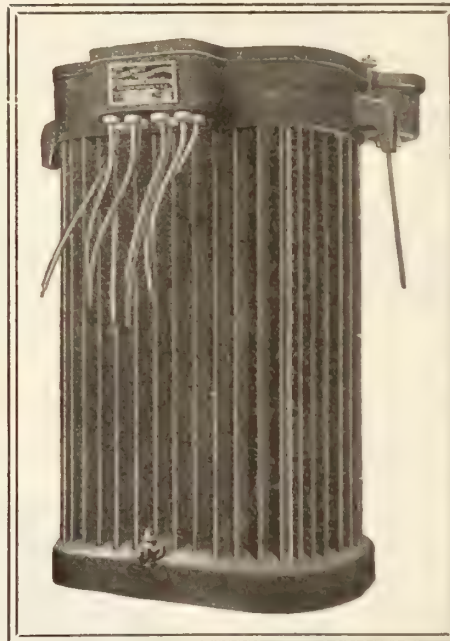
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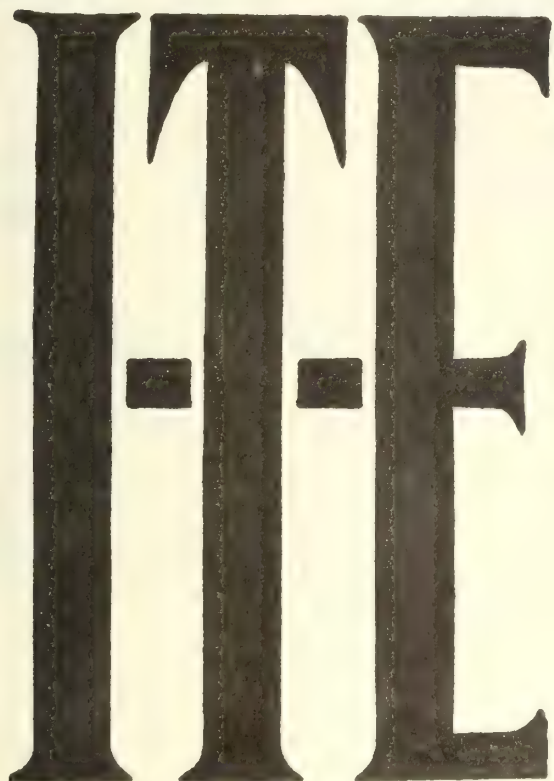
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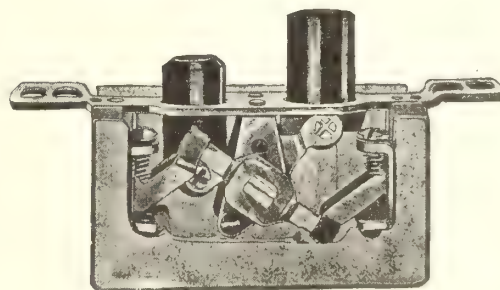
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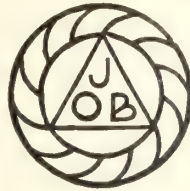
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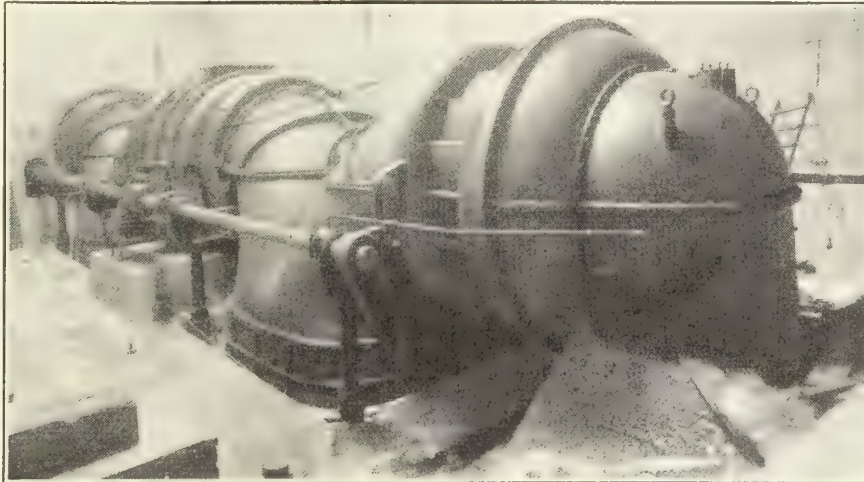
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Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price \$1.50.

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Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.

"Theory and Calculation of Transient Electric Phenomena and Oscillations," by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.

The Dynamo (2 volume), by Hawkins & Wallis. Published in 1900 by Whittaker & Company. Price \$4.00.

The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.

The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 20c.

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Northern Electric Company
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Wilson-McGovern, Limited**MOTOR AND GENERATOR BRUSHES**Calebrough Self-Lubricating Carbon Co.
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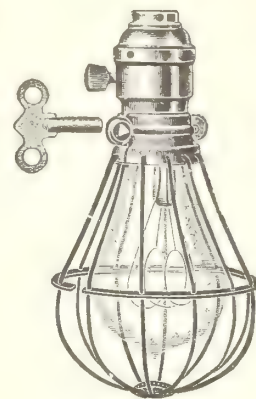
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prevents loss by
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*"Makes Dark Places Light
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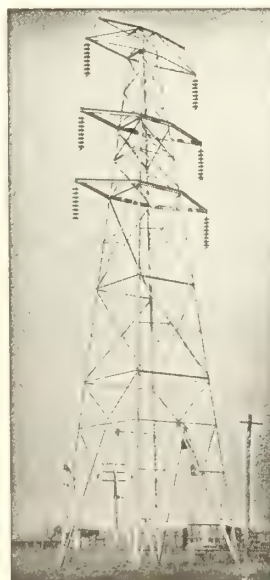
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The styles are new and
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Bakelite-Dilecto has the qualities that readily recommend themselves to the electrical man of wide experience. In the first place, it is practically waterproof, of high dielectric and tensile strength, and proves chemically insoluble when brought into contact with water or weak acids. Unlike most woods, it will neither swell nor warp. Bakelite-Dilecto, though hard and tough, is easily machined.

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2 dips of "OHMALINE"

Insulating Varnish

1,200,000

Megohms Resistance

This is not a solitary STARTLING EFFECT but what you may get

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LIGHT INTENSITY

with a minimum of Power

is obtained with the

Pittsburgh Show Window Reflectors



They will increase the light 400 per cent. to 500 per cent. This has been established by scientific test.

Illustration shows "Pittsburgh" Reflector No. 100 for 100 or 150 Watt Lamp. Dimensions.—Height, 8 3/4 inches; Width, 8 3/4 inches. Holder, 2 1/4 in. Form "O."

It will be to your advantage to learn more about the efficiency of these Reflectors. Write to-day for illustrations of the different types of reflectors for show windows and indirect lighting.

Pittsburgh Reflector and Illuminating Co.

PITTSBURGH, PA.

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BRACKET SERVICE SIMPLIFIED

FOUR
PARTS
ONLY

A Back Strip
An Insulator Support
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An Insulator

From these four parts combinations are quickly and simply produced to make all necessary bracket and rack requisites. The result is lower stock up-keep. The parts are easily assembled and represent a big economy.

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Hillingdon Ave., Toronto



Westinghouse

Type "H" Bus Bar Supports



This line has been developed to meet the growing demand for a superior bus bar insulator, and is the result of years of practical experience with various methods of assembly. The system of tapped steel inserts in special cement was adopted on account of its marked superiority to all clamped or babbitted assemblies, under the most extreme service conditions of vibration, strain, shock, and expansion due to temperature changes.

THE UNITS are of best grade wet process porcelain with highly glazed brown or white finish.

TAPPED STEEL INSERTS are cemented in each end of the porcelain unit by means of jigs, ensuring perfect alignment.

THE TOP AND BOTTOM FITTINGS are of malleable iron, or bronze, and have threaded studs to fit the tapped inserts mentioned above.

CUP WASHERS are interposed between the porcelain and the top or bottom fittings, in order that adjustments may be made without loosening fittings.

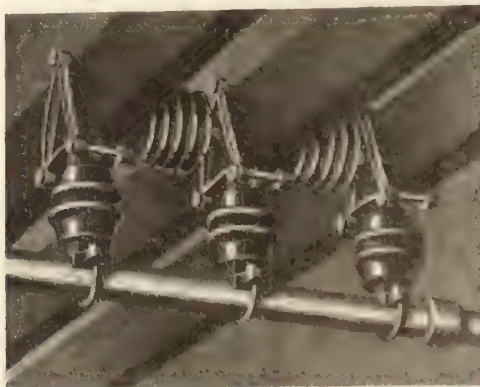
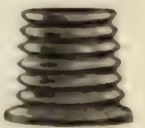
ACCURATE MACHINING of all clamp and bearing surfaces assures perfect contact and assembly.

THE MECHANICAL STRENGTH is very large both on bending moment and in tension.

FLASHOVER varies from 3 to 10 times normal rating according to size. Owing to the elimination of clamped fittings on the porcelain, maximum creepage and striking distances are obtained.

INTERCHANGEABILITY. All fittings are absolutely interchangeable, and designed to render assembly and installation as simple as possible. These units are identical with those employed in type "H" Disconnecting Switches, Choke Coils, etc., thus simplifying maintenance problems and making layout uniform.

WIDE VARIETY of combinations to meet all service conditions.
MADE IN CANADA IMMEDIATE SHIPMENT FROM STOCK



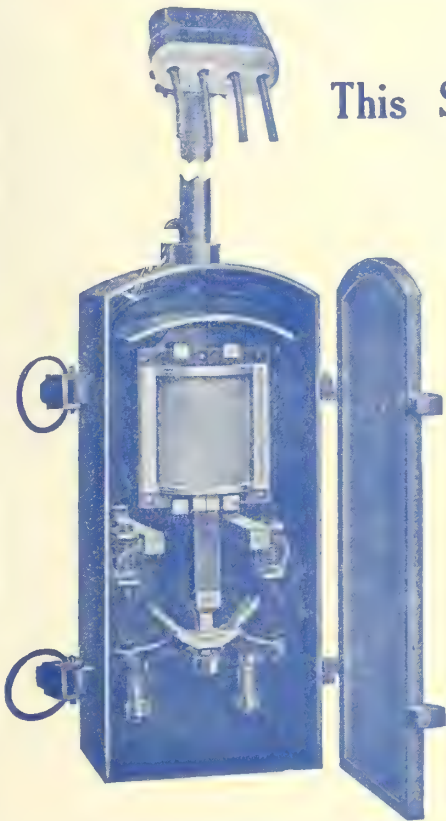
Canadian Westinghouse Co., Limited, Hamilton, Ont.

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They use it for

STREET LIGHTING

Now the fact that it is used by the Hydro-Electric Commission is proof that it is all we claim for it. It certainly is not an experiment, by the fact that it is giving efficient service in many towns throughout Ontario, as well as the other provinces.

No springs, swivels or other complicated mechanisms to give trouble. They close magnetically and are opened by gravity assisted by the tension of the laminated copper contact. All arcing is taken up on the carbons.

Increase the efficiency of your system and decrease the cost of installation by using our Type 17 H.E.P. Solenoid Switches, which are suitable for any frequency on multiple circuit or D. C. Series circuit.

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No mussy sawdust.

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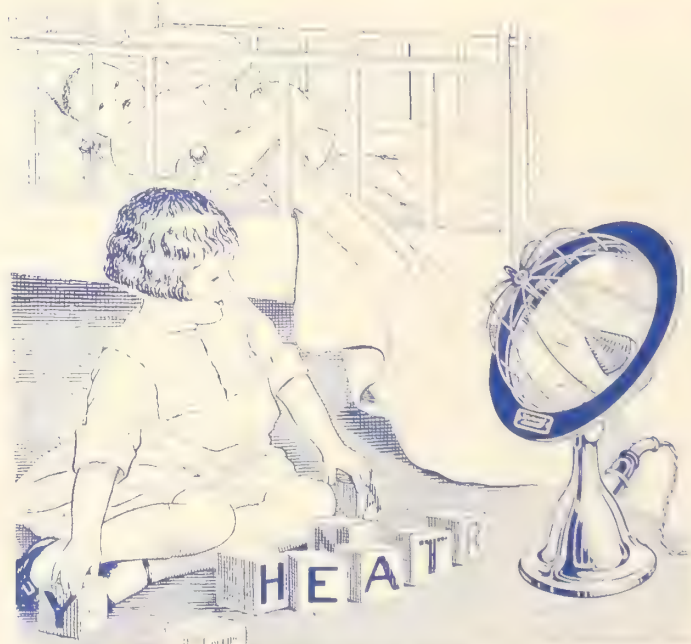
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Try some of our insulators—They all have a very uniform brown glaze, a very distinctive color, no black spots or discoloration.

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A *National Electric Heatray* is the ideal way to keep the nursery warm. It is up, adjustable, and safe from the air. It is electric heat.

In the nursery, bathroom—anywhere—you can enjoy this splendid heat the moment you want it by simply carrying the Heatray to the spot and putting the plug into the receptacle.

**National
ELECTRIC
HEATRAY**

fully nicked. It is hard to tip, but if it does tip, the safely secured guards make it entirely free from danger. Link up with national consumer ad- throughout Canada, by displaying National Heating Systems in your windows.

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Electrical

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Type F.D.
Integrating
Watthour
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Shipments
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SCALE 1/2 SIZE

(THE METER YOU WILL EVENTUALLY BUY)

Is absolutely the last word in meters. It has rain type self locking adjustments with graduated scales for light load, full load and inductive load. Portable and compact, enclosed in its pressed steel case and cover it weighs but 4 lbs. All parts are easily removed; it can be quickly calibrated. A wall fixing wood screw is provided as part of the meter.

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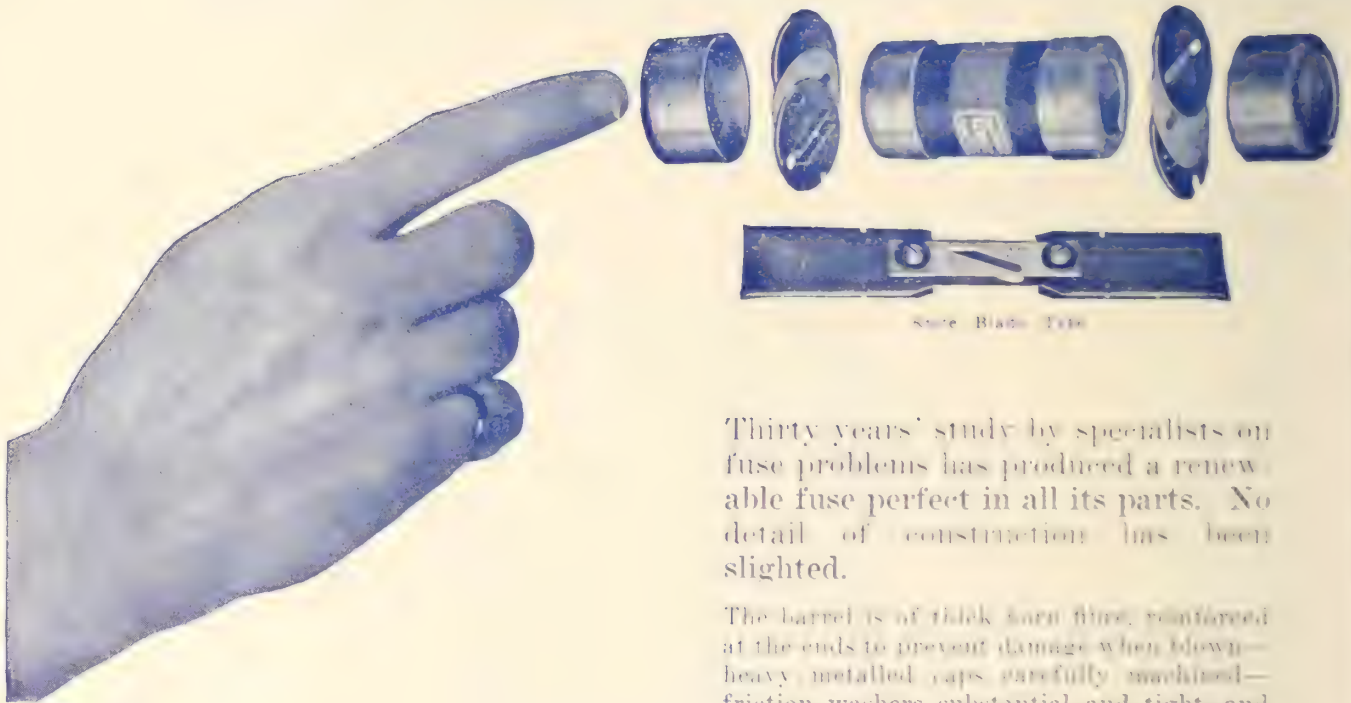
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Northern Electric Shawmut Renewable Fuses



Knife Blade Type

Approved by the Board of
Fire Underwriters and the
Hydro-Electric Power Com-
mission of Ontario.

Thirty years' study by specialists on fuse problems has produced a renewable fuse perfect in all its parts. No detail of construction has been slighted.

The barrel is of thick hard fibre, reinforced at the ends to prevent damage when blown—heavy metal caps, carefully machined—friction washers substantial and tight, and all threads metal to metal. Copper current carrying parts—ampere capacity stamped plainly on ferrule—black tubing; all features making for absolute dependability and convenience.

No tools are needed to renew the ferrule type fuse; for the knife blade type, only a screw driver.

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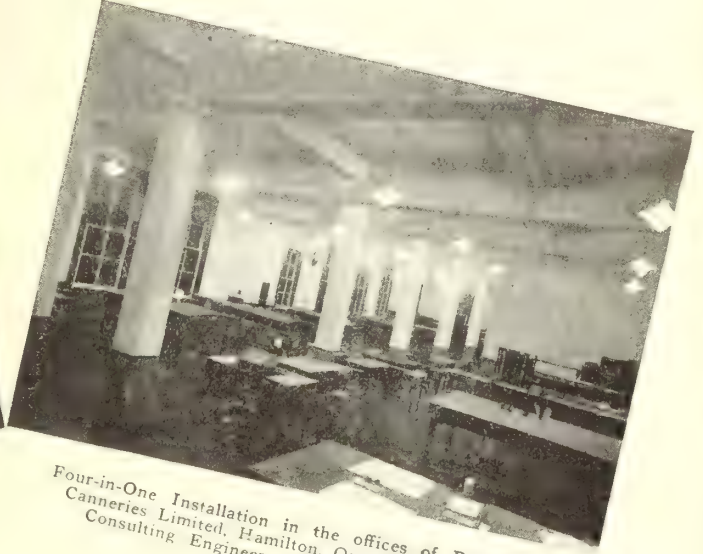
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For Better Illumination



Four-in-One Installation in M.A.A.A. Swimming Bath,
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The New Highly Efficient Glass for Lighting



Sol-lux Glass is a new discovery of the Jefferson Factory and will meet and surpass any lighting tests or comparisons with the highest qualities of white glassware.

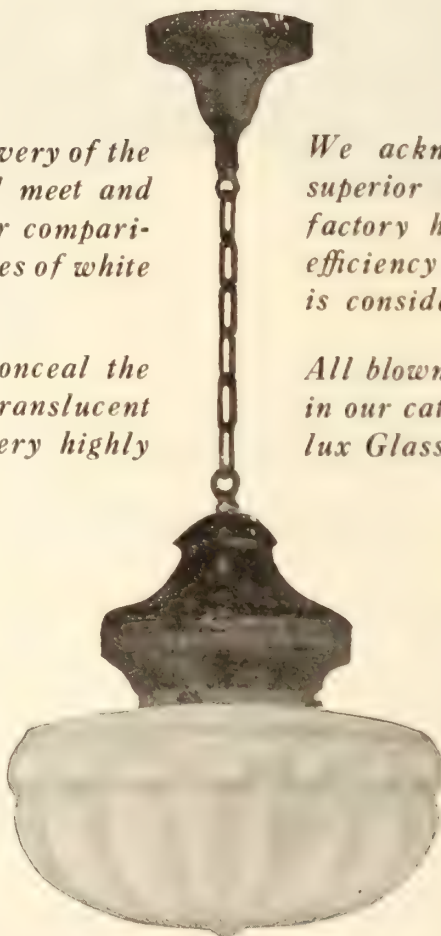
It is just dense enough to conceal the source of light and yet translucent enough to be classed as very highly efficient.

We acknowledge Sol-lux to be far superior to any production of our factory heretofore and feel that the efficiency and completeness of our line is considerably bettered.

All blown lighting pieces illustrated in our catalogues may be had in Sol-lux Glass by specifying same.

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SAMPLES NOW
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Does your transformer safety depend on the weather?



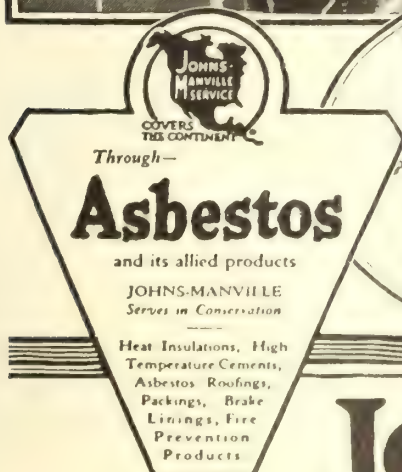
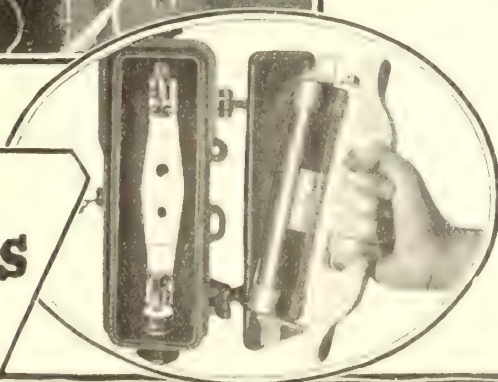
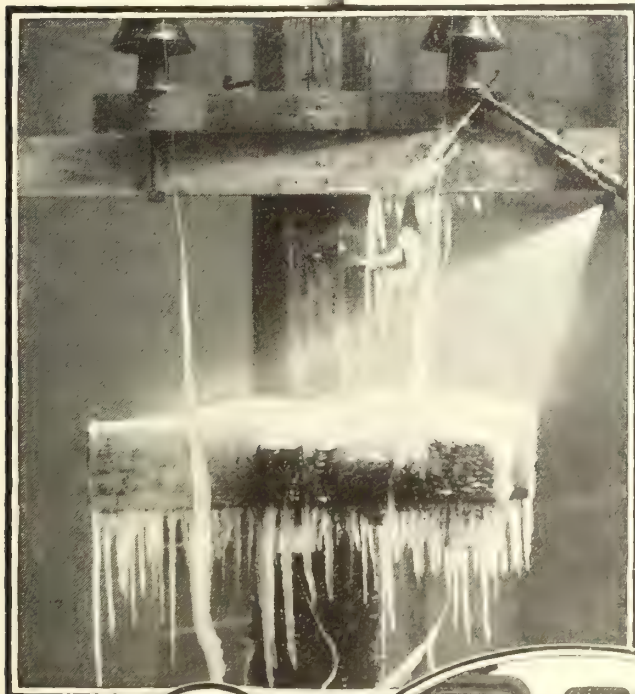
FOR protecting high potential fuses in exposed positions, the "Noark" Primary Box is ideal. Note the test at the left. The illustration shows a 2,500 volt, 1-100 ampere fuse box, like those on the pole, sprayed during freezing weather with water equal to one inch rainfall in 30 minutes; the box meanwhile subjected to 10,000 volts.

When a "Noark" High Potential Fuse blows there is neither loud noise nor blinding flash. And it indicates positively when it is blown. No guessing necessary—a glance at the fuse will prevent the accidents that result from pulling a fuse under load.

The large porcelain fuse carrier handle pictured below extends well out beyond the edges of the "Noark" Primary Box. This permits your men to pull a blown fuse easily and without danger of contact with possible live parts in damp weather.

Through the use of these "Noark" products the safety of *both* your employees and your apparatus is certain, no matter what the weather.

CANADIAN JOHNS-MANVILLE Co. Ltd.
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ELECTRICAL MATERIALS

A Tribute to Canadian Engineering, Enterprise and Industry



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OF the thirty-six Generators now installed, in the three largest Stations at Niagara Falls, Ont., aggregating approximately 350,000 KVA, it is significant that twenty-five units, or 68 per cent of the entire capacity, were supplied by the Canadian General Electric Co., Limited.

The Generator illustrated above is being built at our Peterboro Works, and is part of the C. G. E. installation for the new development at Queenston, Ont. These Generators are the largest water wheel driven machines in the World. They are rated 45,000 KVA, at 187½ RPM, 12,000 Volt, 3 phase, 25 cycle, and weigh approximately 600 tons each.

Canadian General Electric Co., Limited

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Greatest production from machinery, with maximum safety to men and motors, is best obtained by using automatic control equipment

A Good Investment

The CR 7005-A2 Enclosed Magnetic Switch for starting and protecting small a-c motors, consists of a three-pole contactor and inverse-time protective plugs mounted in a metal case.

This case is provided with $\frac{3}{4}$ in. conduit knockouts on top, bottom and both sides, and can be mounted on wall, column or driven machine. Its door is interlocked with the contactor so that it cannot be opened unless the contactor is open. The door may be locked by a padlock.

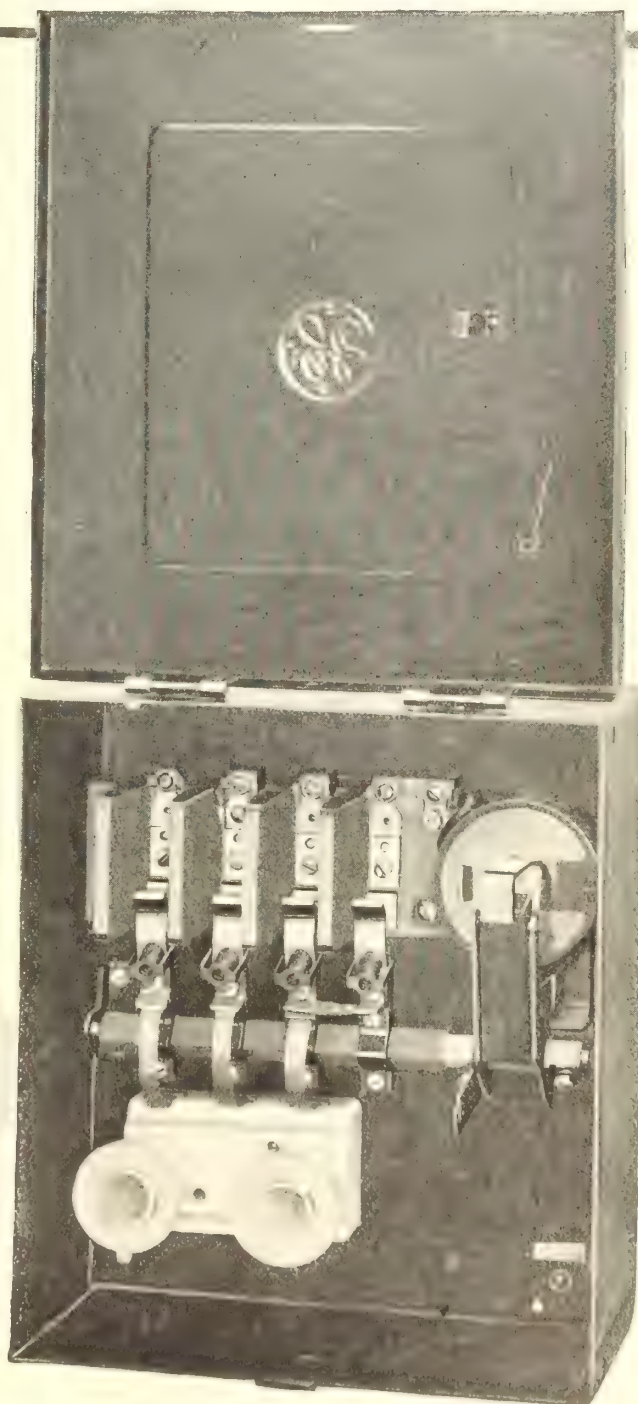
The CR 7005 can be operated by a push button station within easy reach where a machine is manually operated, or by a float switch, pressure governor, or similar accessory where the machine is automatically operated.

The protective plugs effectively protect the motor against all harmful overloads but do not needlessly stop machine and production for the short duration peak overloads that occur in many industrial operations but do not last long enough to endanger the motor.

These switches are furnished for two or three phase squirrel cage induction motors up to 3 HP 110 volts and 5 HP 220, 440 or 550 volts. Ask our nearest office for complete information.



Sectional View of
Protective Plug



Canadian General Electric Co., Limited

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LINES****TENSION**

Ammeter Switches
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 (Remote Control)
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Switchboards

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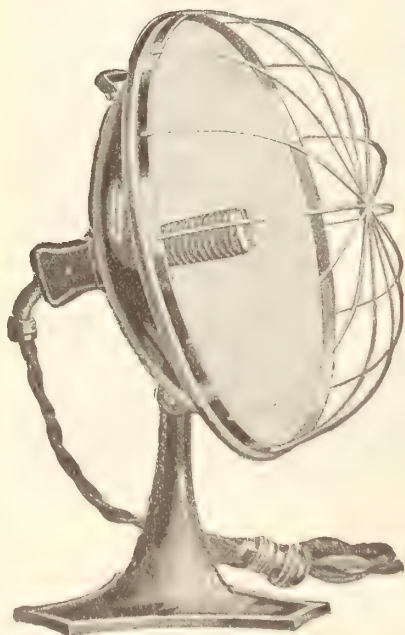
Timmins

Calgary

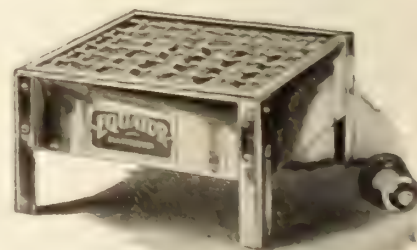
Write to Our Nearest Office. Bulletins, Prices and Information on request.

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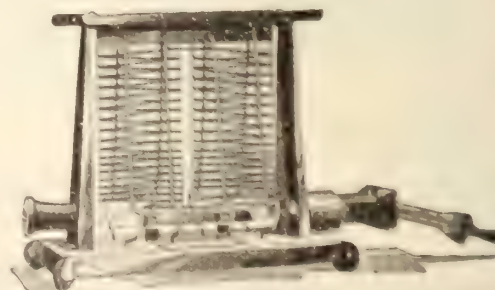
Cat. No. A. 7 600 Watts



Cat. No. A. 5

A DEMAND IS ALREADY ESTABLISHED

SELL THE
DEPENDABLE LINE
AT A FAIR PRICE
AND A FAIR
PROFIT



Cat. No. A. 8

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A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Always specify GALVADUCT or LORICATED CONDUITS

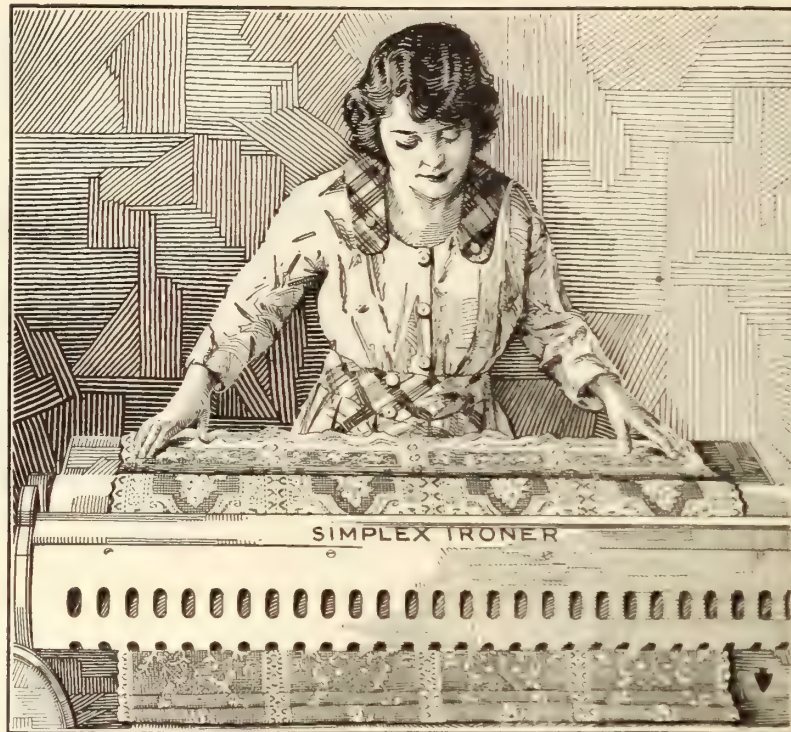
If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg



Saleability

There can be no doubt about the selling possibilities contained in these "Simplex" Ironers.

Their splendid construction and high-grade materials insure a long service. And this, together with the fact that they fill a real need, quickly wins over the busy housewife. In addition we render every possible help to the dealer in the way of window cards, folders and newspaper cuts.

It is an opportunity no electrical merchant should overlook. Write and let us send you full particulars. Prices will appeal to dealer and consumer.

Canadian Ironing Machine Co., Limited
Woodstock Ontario

SIMPLEX IRONER

"THE BEST IRONER"

"HOOVER WEEK"

December 8-15

The Saturday Evening Post of Dec. 10th will carry a special full page announcement of Hoover Week, inviting the public to attend store demonstrations. In addition six hundred thousand Hoover full pages in the December issues of the leading Canadian magazines will feature "Give her a Hoover for Christmas." It will be to the advantage of every Authorized Hoover Dealer to enter heartily into the spirit of Hoover Week



There Still is Time to Sell Hoovers for Christmas!

Order a shipment of Hoovers today by wire. We will ship by express and will include Christmas advertising matter.

Leave to our judgment, if you desire, how many Hoovers, and what models, to ship. We will not ship more than is proper—for one of the fundamental policies of this great business is never to overstock a dealer.

Take this opportunity of discovering how profitable and satisfactory it is to sell The Hoover. There is no better time to do this than just before Christmas, as annually more Hoovers are bought in December than during any other one month. The Hoover has always been widely sought as a practical gift and each year finds it increasing in favor. The Hoover, however, is not subject to seasonal sale—it is an attractive

year 'round proposition, once you get started.

On the famous Hoover Resale Plan, the work of demonstrating, selling and servicing Hoovers will be assumed by our organization, in close co-operation with you.

At your request we will work shoulder to shoulder with you along the same lines that we have successfully worked with so many other dealers.

You will have little money to invest; it will require only small floor space. Your stock of Hoovers would be turned every month—you would make twelve profits a year.

Sell Hoovers for Christmas this year. Order some today. Then later we can get together and lay plans for the profitable sale of Hoovers every week in the year through your store.

THE HOOVER SUCTION SWEEPER COMPANY OF CANADA, LIMITED

Factory and General Offices: Hamilton, Ontario

The HOOVER

It Beats... as it Sweeps as it Cleans

MADE IN CANADA—BY CANADIANS—FOR CANADIANS

The Modern Insulating Material



Insoluble, infusible and chemically inert. Of extraordinary dielectric and tensile strength. Hard and tough, yet readily machined. Neither warps nor swells and is harder and stronger than most woods.

Such is Bakelite-Dilecto, the modern insulation which is rapidly replacing rubber, mica and other materials.

We manufacture Bakelite-Dilecto, Continental-Bakelite and Vulcanized Fibre in sheets, rods, tubes and special shapes and Conite in sheets or rolls from .005" to .020" thick.

THE CONTINENTAL FIBRE CO. NEWARK, DEL.

New York Office: 233 Broadway.	Chicago Office: 332 S. Michigan Ave.	Pittsburgh Office: 301 Fifth Avenue.	San Francisco Office: 525 Market Street.
Toronto Office, Henry Engineering Co., 89 Wellington St. W.		Los Angeles Office : 411 S. Main Street.	

New Monarch Catalogue

Monarch Bulletin No. 10 now ready for distribution, describes the following supply material manufactured by us:

**Wiring Devices, Brass and Porcelain
Locking Lamp Guards, Bell Ringing
Transformers, Fork Service Insulators
and Cable Clamps.**

*Send for a copy of this Bulletin. You will be interested
in the material listed in it—All made in Canada.*

Monarch Electric Company
ST. LAMBERT Limited District of MONTREAL

M O L O N E Y

The CANADIAN TRANSFORMER with a REPUTATION



Single Phase
POWER TRANSFORMER

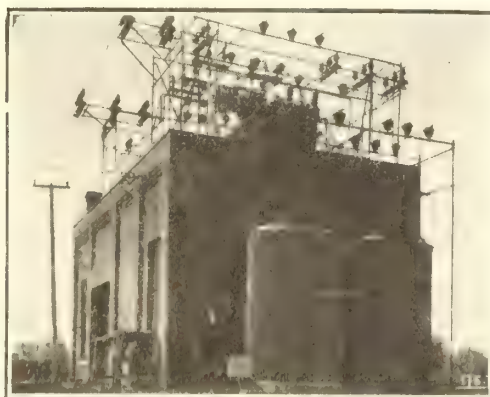
WE claim for our product, absolute dependability under all conditions. Past performance has substantiated our claims and proved superiority of design and workmanship.

The installation of a Moloney Transformer means positive and efficient service. The name "Moloney" stands for entire satisfaction.



3 Phase
POWER TRANSFORMER

A
Canadian
Made
Transformer



Write for
Bulletins
185 190
195 210

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

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Exide

MADE IN CANADA
BATTERIES

Consistently Dependable

Central station engineers, railway signal and car lighting specialists, wireless and telephone experts—skilled men in all lines of work where storage battery power is used—pin their faith to Exide Batteries.

So do hundreds of thousands of motorists, who find in Exide Batteries—with their long life, ample power and greater dependability—the ideal source of power for starting and lighting their automobiles.

But no matter for what purpose you select an Exide Battery, there is built into it the power, long life and dependability that comes from 33 years' experience in building storage batteries for every purpose.

(Our engineering department will gladly cooperate with you in solving your storage battery problems, no matter what phase they cover.)

EXIDE BATTERIES OF CANADA, Limited
153 Dufferin Street,
TORONTO

Exide Batteries are made in Canada, in England, and in the United States. Into the Exide is built the experience of the oldest and largest manufacturers of storage batteries in the world.

MR. CONTRACTOR - DEALER—

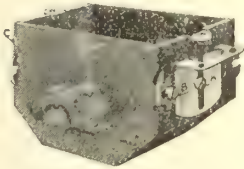
are you PREACHING the gospel of "More Convenience Outlets" to the Architects and Owners? The chandelier must be cast into the discard as a medium for supplying current to electrical devices. More Floor Outlets, Receptacles and Switch Boxes must be installed if current consuming devices are to be used daily as a necessity instead of as an occasional luxury.



Fullman Adjustable
Floor Outlet



Fullman Non-Adjustable
Floor Outlet



Improved "Steel City"
Switch Box

Write for sample of our new
Improved Switch Boxes
to show to your customers.

STEEL CITY ELECTRIC CO.
PITTSBURGH, PA.



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment

"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade



**“Erie”
Fittings**

10,000 COMBINATIONS

The name “ERIE” is attracting world-wide attention in the field of electrical pipeframe construction because ERIE Fittings embody

Simplicity in design

Adaptability to use

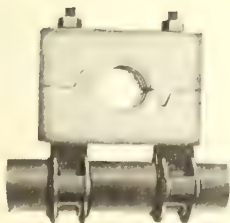
Superiority over all former types

The **MODERN** and **PRACTICAL FITTINGS**

The **Savers** of **Time, Labor and Money.**

Don't forget “ERIE” is their name.

Catalogue on request



ERIE ELECTRICAL EQUIPMENT COMPANY, Inc.

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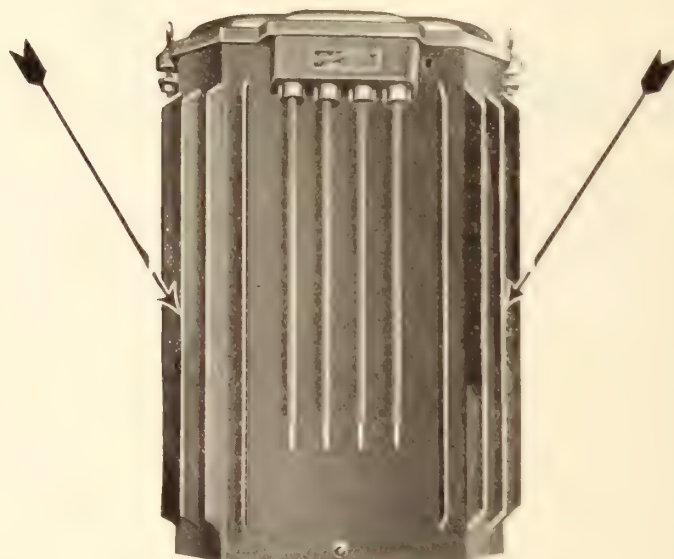


Packard

TRANSFORMERS

Here they are!

Heat Dissipators, a new exclusive feature of
Packard Welded Steel Cases



The advantages are these—smaller Transformer, less weight, lower temperature rise, and greater overload capacity

Prompt delivery of all standard sizes from stock. Special units supplied at short notice.

Get in touch with our nearest agent now.

Others may follow, but we lead.

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Confederation Life Building, Winnipeg

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W. H. Hazlitt & Co., Ltd., Room 401 Northwest Bldg., Vancouver, B. C.

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Contracting Conduit Engineers

Head Office
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Vancouver

Winnipeg

Smith Hydraulic Turbines

**Have Justified Their Installation in many
of America's Biggest and Best**

Hydro Electric Developments

The accompanying view illustrates a SMITH RUNNER, 13 feet diameter, made in one continuous casting by means of dry sand cores.

THREE TURBINE UNITS (of which these runners comprise the rotating element) furnished for installation in the Yadkin Falls, N.C., plant of the Aluminum Co. of America. Each unit develops 10,000 H.P. at 90 R.P.M. under 48 feet head, using water at 92 per cent. efficiency.

Write Dept. "N" for Bulletin.

S. MORGAN SMITH CO.

YORK, Pa., U.S.A.

H. B. VANEVRY, Representative
405 Power Building, Montreal



"Banfield" Universal Fixture Stems and Fittings

The Banfield Fixture Stem is the latest and most efficient article of its type on the market. It is known as the Universal Stem because of its interchangeable features, being adapted for all types of fixtures by means of the many fittings which are threaded to attach to the end of the stem. Thus it is possible to convert this stem into a single chain hanger, a large commercial fixture hanger, a chain hanger for two, three or four chains, a bracket hanger, or a drop cord.

The interchangeable features eliminate hickeys, nipples on brass tubing and loops. In short this stem standardizes your stock to a minimum.

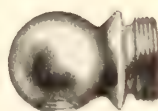
No. 100
4" stem



No. 600
Large hook



No. 500
Small hook



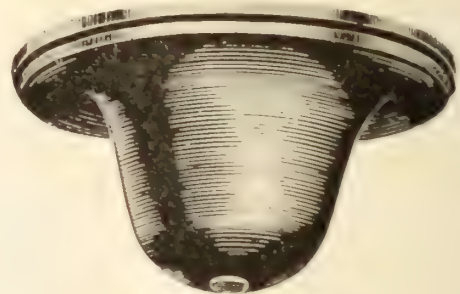
No. 300
Bracket knob



No. 400—2 Chain Hanger
" 403—3 " "
" 404—4 " "



No. 200
Drop Cord
Fitting



No. 1186 Canopy
4" wide 2" deep



No. 4269 Canopy
4" wide 2" deep

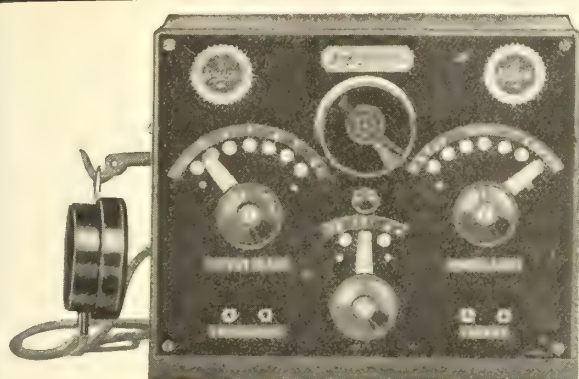
Only one length of stem long enough to be used with above canopies.

All fittings carried in stock in Brush Brass Finish.

W. H. BANFIELD & SONS LIMITED

370-386 Pape Avenue

TORONTO



Master Station



Sub-Station



Line Cord



No. 60 Horn



System "A"

SUPER-SENSITIVE
Superphone
TELEPHONE DEVICES

Here's All You Need to Make "Big Business" Yours

Every executive in every progressive concern needs a Superphone Inter-section Telephone system, to keep him in continual contact with his various department heads and, in fact, all employees under him.

With a Superphone Inter-Phone he can be at his desk or anywhere in his office yet transmit instructions and data to any part of the building. Receivers are not necessary except where desired as the Loud Speaking attachment reproduces the voice as if the speaker were present in person.

The Superphone Inter-Phone is becoming recognized as a business asset and as great a necessity for efficiency as the typewriter. Its particular advantage over any other telephone made lies in the fact that it permits secrecy and is so arranged that either a Loud Speaking or Silent Receiver or both can be used. It is the only telephone instrument today which makes possible the installing of either one or the other without the need of additional wires. The Loud Speaking Device being equipped with plug connections enables the user to connect or disconnect it at will. Quickly, cheaply and easily installed in any office.

There are many other big selling features of Superphone Interphones. Ask us about them today.

G. Boissonnault Company, Inc.

26 Cortland Street, New York.

Manufacturers of

Sound Amplifiers
Detective Deteclographs
Deaf Phones
Microphones
Receivers
Wireless Specialties

General Catalogue
sent on request.

—Single Wall

—Indestructible

“TRIDUCT”

—Easy Fishing

—Full Coils

—Made in Canada

Selling Agents—

CONDUITS COMPANY, LTD.

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TAKE *the Necessary* STEPS

... to a ...
**SUPER SAFE
INSTALLATION!**

**CONTINUITY
of**

**SERVICE
PAYS**

REAL

**DIVIDENDS
DIVIDENDS**



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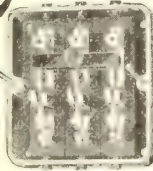
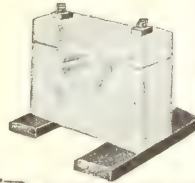
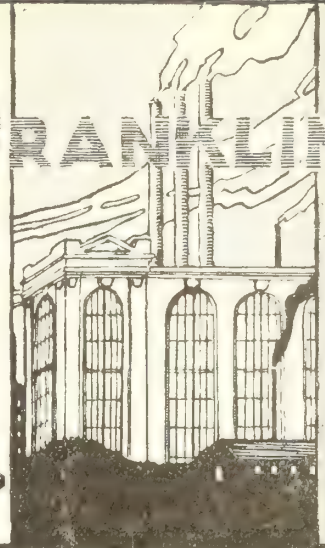
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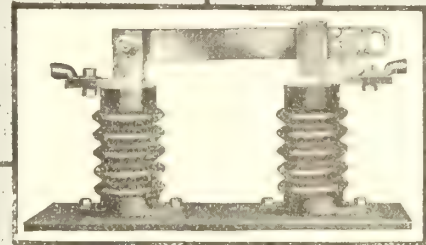
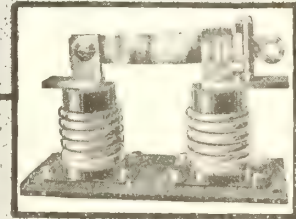
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FRANKLIN



N



*Install the "Franklin"
and forget it!*

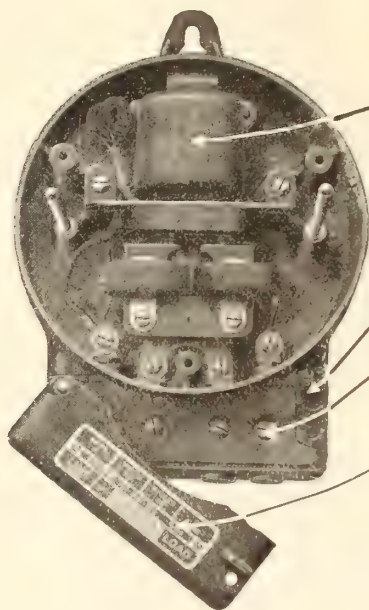
**ELECTRICAL DEVELOPMENT
& MACHINE COMPANY**

PHILADELPHIA

SALES AGENTS

EASTERN STATES CENTRAL STATES
Utility Products Corporation Midstates Engineering Co.
50 Church Street Marquette Building
New York City Chicago, Ill.

Note These Important Features of Sangamo Type H Watthour Meter



The entire motor magnet system is mounted on the base, which is accurately machined and each part dowelled in position so that the system as a whole is kept in perfect co-ordination, and any part of it may be removed or replaced in case of accident or repairs.

The lower fastening screws are under seal, preventing shifting of meter to angular position.

The terminal box is a separate chamber, and the terminals themselves are embedded in fire-proof composition insulation which effectively seals the entrance of the terminals into the meter proper, making them dust and water-proof.

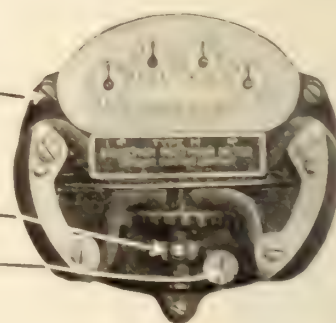
The name plate gives the disc constant as well as the type of meter.



The grid carrying the moving system and permanent magnets may be quickly removed without disturbing any electrical connection or mechanical adjustment and by its removal the motor magnet system is exposed for inspection and accessible for repair.

Full-load adjustment positive, and clamping screw easily accessible.

The light load micrometer adjustment is positive and susceptible of extremely accurate and fine adjustment. One complete turn of the main screw corresponds to $2\frac{1}{2}$ per cent at $1/10$ of full load.



Let Us Send You Complete Information and Bulletin 5518.

Sangamo Electric Company of Canada, Limited

Factory: TORONTO

Head Sales Office: MONTREAL

"FIXTURES"

Special Xmas Numbers at Pre-War Prices



No. 768
Dainty Boudoir Lamp
Finished in Ivory or
French Gold Wired
complete as shown
Height 14 inches
Shade 8 inches



No. 771
Elegant Mantle candle
Lamp Finished in
French Gold Wired
with Candle Pull
chain socket as shown
less lamp



No. 768 1-2
Handsome Dresser
Lamp Finished in
French Gold or Ivory
Wired complete as
shown Height 15
inches Shade 7 inches

Basic
Patents
Granted



LOCOMOTIVE WASHER

Equipped with Gas or Electric Heater

MADE IN CANADA

Write for descriptive booklet.

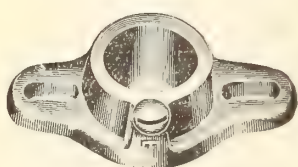
Distributors for Eastern Ontario and
Province of Quebec.

Canadian Electrical Supply Co., Ltd.

165 Craig St. West, Montreal

Branch:
28 St. Joseph St., Quebec, Que.

T & B Conduit Fittings



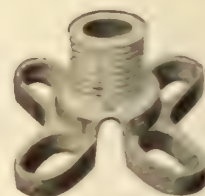
Ground Clamp & Box Support



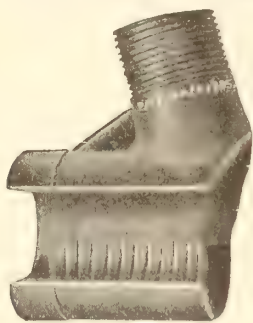
Chase Nipple



3/4 Adapter



Hickey Fixture Stud



Lakin Hickey

Distributed in Canada solely by
Northern Electric Company
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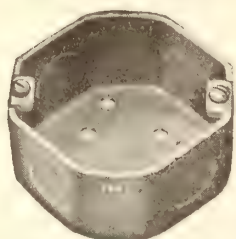
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Halifax
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Hamilton
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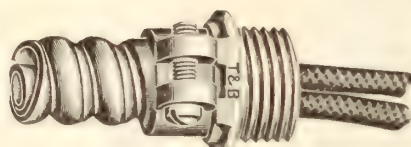
Regina
Calgary
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Vancouver



Concrete Insert



No. 24151 Octagon Box



Squeeze Connector



Bushing



Bushing Caps

Manufactured by

THOMAS & BETTS COMPANY

NEW YORK CITY



The dependable service users obtain from electrical devices which are powered with R & M motors, is an important sales asset to the dealer, the jobber and the manufacturer who makes the device. It insures pleased customers, the kind who boost the product and make it easy for the dealer to sell their neighbors and friends.

This is the reason manufacturers of quality appliances in ever increasing numbers equip their product with R & M motors. And it is also the reason why so many jobbers and dealers favor devices so equipped.

**The Robbins & Myers Company of Canada
Limited, Brantford, Ontario**

Robbins & Myers Motors

Be Prepared for a Christmas of Practical Giving

IT'S to be the Christmas of practical giving. Folks that in other years went out and bought at random are this season going to snoop around for days on end, seeking out the most practical gifts on the market.

And what gifts more practical than electrical appliances or an electric heater! What gift could be more downright sensible and practical than a trim Canadian Beauty Electric Iron, a Toaster, a Three-Heat Grill or any of the other members of our popular family of electrical appliances?

Can you think of a gift that could be of greater use than a Majestic Electric Heater?

The dealer that handles New Canadian Beauty Appliances and who goes out vigorously after all the business he can get will benefit by

this condition—unquestionably.

Every New Canadian Beauty Appliance sold creates an everlastingly favorable impression, because it gives such perfect service. Build wisely, then—Look ahead. Think of the many future sales that will spring from every single sale made this season!

Are you ready? Fully stocked? Equipped to do a roaring trade? If not, act now. Wire your order, write it or 'phone it to your nearest jobber or direct to us. But, take our tip. Don't delay. Get your order in at once.

Renfrew Electrical Products, Limited

Head Office and Works: Renfrew, Ontario

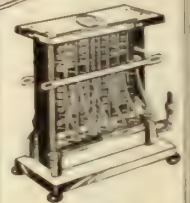
Branches: 29 Richmond Street, West, Toronto.

803 Lindsay Building, Winnipeg, Man.

The New
Canadian Beauty
Electrical Appliances

Renfrew
Electric
Products
Limited
Renfrew, Ont.

Canadian Beauty



Toaster

Canadian Beauty



Three-heat
Grill

Canadian Beauty



Iron

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Stove

Canadian Beauty



Majestic
Heater

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Percolator

Canadian Beauty



For nearly thirty years the recognized journal for the Electrical Interests of Canada.

Published Semi-Monthly By
HUGH C. MACLEAN PUBLICATIONS
LIMITED

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HEAD OFFICE - 347 Adelaide Street West, TORONTO
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ADVERTISEMENTS

Orders for advertising should reach the office of publication not later than the 5th and 20th of the month. Changes in advertisements will be made whenever desired, without cost to the advertiser.

SUBSCRIBERS

The "Electrical News" will be mailed to subscribers in Canada and Great Britain, post free, for \$2.00 per annum. United States and foreign, \$2.50. Remit by currency, registered letter, or postal order payable to Hugh C. MacLean Publications Limited.

Subscribers are requested to promptly notify the publishers of failure or delay in delivery of paper.

Authorized by the Postmaster General for Canada, for transmission as second class matter.

Vol. 31 Toronto, December 1, 1921 No. 23

It Behooves us to be Prepared

At the recent dinner of the Hamilton Electrical Development League, reported in our last issue, Mr. Louis W. Pratt, chairman of the meeting, concluded his remarks as follows:

"It behooves us as citizens of the Province of Ontario to so direct our energies that when the great power development from Chippawa to Queenston becomes an accomplished fact, that every last kilowatt in this colossal plant will be giving up its energy for the service of our fellowmen, for the betterment of conditions of all classes in the Province and for the justification of the unselfish effort and wonderful vision of our statesmen and pioneers in the development of power on a scale not hitherto attempted."

This admonition must be taken to heart by every electrical man within reach of Niagara power. In the past few years the industry in Ontario has been handicapped by the lack of a sufficient amount of power, but to-day these conditions are about to be reversed and unless we are wide awake to the situation, the new year will find us with a supply of power greatly in excess of the demand. Now that the preliminary work of the engineers of the Hydro Commission is completed, additions to the capacity can be made at will.

Mr. Pratt speaks from an experience of many years in the electrical industry, and his admonition must be taken in the same spirit in which it was offered—sincerely and seriously. This does not mean, of course, that we have an impossible task ahead of us. We have not. The history of

electrical development during the last ten years has given us all confidence that the field of the electrical salesman, so far as the immediate future is concerned, is not even approaching saturation. What Mr. Pratt means, undoubtedly, is that this is a bigger block of power than most of us realize, and it would, therefore, seem the part of wisdom to get our organization ready in advance to take care of the situation that we are perfectly certain will confront us in the very near future.

The city of Hamilton, Mr. Pratt's home town, is showing the way, at the moment, to take care of this added power supply. No doubt he, personally, has had much to do in molding the viewpoint of his fellow citizens in this respect. It is an example, however, that must be followed generally. Other cities must take up the work as enthusiastically as Hamilton is doing. There is no immediate possibility of over-reaching ourselves, on account of the great supply available. The Niagara district offers a field for development in the next five or ten years that is not likely to be exceeded by any other section of Canada.

Report of Quebec Streams Commission

The Quebec Streams Commission has issued their ninth report, comprising 140 pages and a large number of plans. During the twelve months the Commission's work mainly consisted of investigating the possibilities of a large number of water powers and of collecting data as to meteorological conditions, flow of rivers, and other particulars of interest to hydro-electric engineers. It is stated that the companies benefiting from the Gouin dam contributed \$201,000 to the Provincial treasury, while the amount received from the reservoirs on Lakes St. Francis and Aylmer was \$57,500.

The Commission made surveys of Lakes St. Joseph, St. Marie, and Theodore, in the townships of Howard and Morin, to determine the storage possibilities offered by these lakes for the benefit of the water powers on the Du Nord River. Also, owing to great damage caused by ice jams on the Chateauguay River, a survey was made there, and it is suggested that the problem can be solved by building two dams which would flood the rapids near the village of Chateauguay. A long report is made on the floods in the Chaudiere Valley. Mr. O. Lefebvre, the chief engineer of the Commission, is of the opinion that nothing can be done to prevent such disastrous floods as occurred on July 30th, 1917, but that something can be done by removing a number of piers on the river and by constructing a dam above St. Georges, near the site of the Lessard Dam, to protect St. Georges and Beauceville against losses by floating ice.

Engineers of the Commission made studies of the Blanc and Des Coeurs Rapids, on the St. Maurice; of the principal water powers on the Chamouchane River and the Peribonka River, as well as several powers on rivers on the north shore of the St. Lawrence. In most instances estimates are made of the amount of power available. Besides this work studies were made of the possibilities of preventing ice damage on the Becancour River and possibilities of regulating the flow of the Shawinigan River. Owing to the importance of hydro-metric data, it is proposed to extend the metering on a large number of rivers.

On January 1st, 1920, the water wheels installed in the Province of Quebec had a capacity of 910,029 h.p.—of which 623,088 h.p. were generated in central stations. The pulp and paper mills at this date were using 267,242 h.p.; other manufacturers were using 270,961 h.p.; 90,000 h.p. were used for lighting purposes and 54,000 h.p. for tramway operation. Water power was then developed to the extent of 391 h.p. per thousand inhabitants, as compared to 360 h.p. for Ontario. The pulp and paper mills generated in their plants 189,781 h.p., and bought 78,461 h.p. from central stations.

The Outcome of the Printers' Strike

It is now six months since the publishers of the "Electrical News" and the majority of other publishers and commercial printers in Toronto went to the mat, so to speak, with the International Typographical Union. Frequent inquiries having been made by our readers as to the situation, it may not be amiss to review the various phases of the strike up to this date.

The Typographical Union may be said to be the Union de Luxe. The railroad labor organizations fade into insignificance when compared with this clever aggregation of United States officials which has endeavored to control the printing art. Yet their very strength proved their undoing. More men can stand up against adversity than against prosperity. So it would seem to be in respect to unionism. Arbitrary demands followed—virtually a closed shop, where no man could work peacefully unless a member of the union, the foreman controlled by the union, priority laws in respect to employment, etc. The wage demand was \$44.00 for 44 hours—an increase in pay, a reduction in working hours, the combined factors making an increase of 36 per cent. in cost of production, which we were expected to pass on to our advertisers and subscribers. We refused to agree to their demands. What we will call Scene One closed with every man in our plant walking out on June 1st.

In the intermission, please read the following :

In the Book of Laws of the International Typographical Union, in effect January 1st, 1921, appears the obligation for members :

"Article 12. Sec. 1 : All subordinate unions shall have an article in their constitution which shall read as follows : '.....that my fidelity to the union and duty to the members thereof shall in no sense be interfered with by any allegiance that I may now or hereafter owe to any other organization, social, political, or religious, secret or otherwise.....To all of which I pledge my most sacred honor.'"

The opening of the Second Scene found the men on the streets, picketing the plants, a few, perhaps, downcast because forced out by their Indianapolis officials, but the big majority of them beaming with contentment and decidedly "chesty" because of the assured victory in a few days, or a few weeks at most. And why not? For, through the practice of closed shop rules, non-union compositors in Toronto were almost non-existent. But they overlooked at least three important points—the injustice of their cause; the moral influence against them when they attempted to show that "Might is Right," and the determination of the employers to conduct "open shop" in future. The first few weeks were strenuous. Getting a new organization together was a slow process. Our publications suffered to some extent, but our readers and advertisers everywhere gave commendation for the stand taken. The office staff turned in: some printers were procured from outside; a few of the locals drifted back to their positions, and intensive training of apprentices was inaugurated. The employers, at a large expense, equipped a school for compositors and it was not long before they began to benefit by the product of this school. New pupils were sent to the school as rapidly as graduations were made therefrom, with the result that, without the assistance of the compositors who went out on strike, the 48-hour plants in Toronto are almost back to normal.

The tragedy occurs in the Third Scene, which is the present-day situation. The Indianapolis organization called out on June 1st something over 700 compositors from the Toronto employers who refused to grant their demands. To-day there are at work in the 48-hour "open shops" 604 compositors, and each day the number continues to grow. These shops represent about 80 per cent. of the total production of printing in the city. To these men permanent employment has been guaranteed as long as they perform satisfactory service. What, then, of the strikers? Several hundred craftsmen out of employment and only a few positions at best. Misled by their leaders, living on day-to-day promises that the strike was about to end, encouraged by occasional bonuses to strengthen their morale, the rank and file have been kept in the dark as to the true situation. As the curtain drops, what do we find? The "open shop" firmly established in the printing industry in Toronto; the employers able to take care of their work; the veil lifted from the eyes of the strikers, and the weaknesses of autocratic leadership revealed in a positive but painful manner. The Winter before the men and no work.

The fight of the publishers and employing printers in Toronto has been a fight for principles, a fight against arbitrary rule, a fight for right. It should encourage employers generally to stand out for the "open shop," which in substance means the right of every man to be permitted to work regardless of union affiliations.

Throughout the strike the "Electrical News" and other Hugh C. MacLean publications have appeared regularly, and, with the exception of some slight interruption at the outset, on time. Not an issue has been missed. The publishers are very grateful for the courtesies and consideration extended during this period.

Ontario's Lieutenant Governor, Pays Tribute to Value of Canada's Business Newspapers

Ontario's Lieutenant Governor, Col. Henry Cockshutt, himself an outstanding success as a business man, paid a sincere tribute to the business newspapers of Canada when, speaking at a luncheon in connection with the annual meeting of the Canadian National Newspapers and Periodicals Association at the King Edward Hotel, Toronto, on Thursday, Nov. 10; he said:

"I am especially glad to be with you today because I believe that the influence of the business press will be one of the most important factors in re-establishing business conditions in Canada on a safe and sane basis. I make a distinction between the business newspapers and the daily press because of the greater confidence your readers have in them. People read the daily newspapers to keep abreast of the general news of the day. They are interested in what is happening around them and they read to satisfy their desire for excitement or interest or entertainment. What they read in the daily newspapers today is forgotten tomorrow.

"But this is not the case with the business newspapers. Business men need the service of these papers in the conduct of their everyday business life. I have noted that they usually have a business paper or two in their pocket when they go home Saturday night. I do not say that they read them on Sunday; that I do not know, but I do know that they study them carefully, and that a great number of your readers will come to their business on Monday morning with some clipping from your paper in their pockets. They will say to their associates: "This is the situation, I can show it to you in this clipping." For that reason, gentlemen, I say that yours is the greater obligation, because you are leaders; because you are helping to build up the business fabric of the country.

"You should be very careful that everything that appears in your columns bears the imprint of the truth. You must be sure that the news you give is correct beyond question, because there are thousands of your readers ready to set their business course by the information and advice you give them.

"I am familiar with a good many of your publications, and I can personally attest to their high character. It is of vital importance that this high character should be maintained and that no effort should be spared to give in your columns the maximum of service.

"In these days when there is disorganization, dissension, disruption in all walks—business, politics and religion—there is a great place for the business paper to bring out more complete information, to assist in making us all realize we must work for a common cause—the upbuilding of our country.

"The business men of this country need your assistance. They are looking to you for information and advice, and are expecting it. On your shoulders, therefore, perhaps more than on the shoulders of any other single agency, rests the obligation to meet the needs of these trying days, by a sane and sound presentation of the case as it exists at the present time, a presentation free from private bias, or the desire to serve a popular demand.

"You can, and I believe will, be one of the largest factors in helping to bring about a satisfactory readjustment of the business conditions of this country."

It is understood that the Hydro-electric Power Commission of Ontario is recommending to the Ontario Government that the provincial grant of 50 per cent. towards the cost of construction of primary power lines in rural districts be made retroactive. If this is done some thirty to forty townships will secure a reduction in rates.

Business on the Mend

A few days ago being anxious to confirm our own opinion that the electrical business was on the mend and that all that was needed to demonstrate this fact beyond question was a determined effort to put over the best Christmas trade in the history of the industry, we sent out a number of inquiry letters. Almost to a man, the replies are very encouraging. If space would permit, we should like to print them all, but the following is typical. The situation to-day seems to be summed up admirably in the answer of a wide-awake salesman to the question "How do you find business?"—"By going after it!"

Editor Electrical News:—

I have your letter and quite agree with you that business is on the mend. We have noticed this particularly in regard to electrical appliances, such as sweepers, washers and ironers, in which trade has been quite dull until very recently when it has picked up very much. These lines adapt themselves excellently to the present conditions as they are entirely independent of building operations which control so much of the volume of the electrical trade, but respond readily to intensive effort in the selling line. We know that a number of dealers in various parts of the country, who have been getting actively after this business, are showing excellent results.

You speak about the Christmas trade and we think you are right in your remarks as to the important bearing that good Christmas trade will have in inspiring confidence. In this connection would point out that the electrical dealer has a splendid chance, as in addition to electric portables, electric reading lamps, etc., which most of them carry in stock, there is a wonderful sales possibility in all kinds of electrical appliances. This is helped by the fact that for the last few years there has been a decided tendency to give sensible gifts at Christmas time, and electrical appliances serve to adapt themselves excellently in this respect. It used to be that December was the quietest month of the year with us for electric washers, but during the last year or two there has been a big change in this respect, and our washer sales last December were almost as large as any month in the year.

So far as we are concerned we are actively preparing to get our share of this business, and back up our dealers who are prepared to put real effort into the selling of electric washers, cleaners, and other appliances as Christmas gifts. We do not ask them to purchase any stock unless they want to, all we ask is that they have a sample for display purposes. We furnish them with advertising literature, follow-up letters, window display cards, etc. We know that this will produce business for every dealer who puts real selling effort behind it. After all, this is the real crux of the situation, and as you say, this is no time to sit back and simply wait for developments, and the sooner everybody recognizes that they must look to their own efforts to bring about better conditions, the sooner we will get back to normal.

McDonald & Willson,
(Signed) C. H. Willson,
President.

The American Society of Mechanical Engineers have now ready for sale, in book form, "The Life of George Westinghouse". This is now offered to the members of the various engineering societies and will be available early in December. A half-morocco binding costs \$6.00; cloth binding \$3.50. Later it is planned to publish a popular edition at a cost of approximately \$2.50. Subscriptions are now being received for this book at the Society's headquarters, 29 West 39th St., New York.

Winnipeg City Completes Duplicate Line

By E. V. CATON

Chief Engineer, Winnipeg Hydro-Electric System

Due to the increased load on the City of Winnipeg Hydro Electric System, it was decided in 1919 to complete the construction of the duplicate transmission line which was commenced in 1913 but abandoned in 1914, owing to the war and the decision to install synchronous reactors in the city's terminal station. This new line has now been completed and put in service. It is built along the existing right-of-way and parallels the old line.

Three types of towers are used, depending upon the soil conditions found along the line, which vary from the clay subsoil found around Winnipeg to sandy loam, muskeg and rock. The three types used are a lattice pole, the tangents for 35 miles east of Winnipeg, where the soil conditions are mostly clay or gumbo; braced and flexible towers for the remainder, the flexible towers are designed as "A" frames and are spaced five to every braced tower, or three to every braced tower, depending upon the exposure and soil conditions. Within the city limits where the right-of-way is only 60 ft. all towers are braced, also on all angles, changes in elevation, specials, crossings, etc.; the line is dead ended every five miles on extra heavy braced towers and at all rivers and railroad crossings. The standard spacing of towers is 400 ft.

strung along the whole line, two wires being used where flexible towers are installed.

Foundation conditions are exceptionally bad along a large section of the line, which runs through muskeg country. In this section piles are driven and a re-inforcing concrete cap is cast in place on to the pile, the cap being tied onto the pile by spike bars. Some of the work was done under the winter weather conditions, but the results indicated that it was more economical to carry this out in the summer and to coffer dam or pump the excavations to keep the water out while pouring the footing, rather than to do this work when the ground was frozen and no water was present. This was further confirmed by the condition of footings on the old line which had been placed in the winter to avoid trouble with the water always present in the summer.

The transmission system of the Winnipeg Hydro now consists of four circuits between the power house and the city.

Owing to all the civic utilities depending upon a continuous supply of power for their operation and the tremendous growth of the domestic load in the city, due to the almost universal use of electric cooking ranges and other conven-



This illustration shows three views of the Winnipeg Hydro System's new line. On the left is a special dead ending and angle tower, located at the power house end of the line; in the centre there is shown one of the lattice poles, and on the right, a standard braced tower.

The conductors are strung in a vertical plane on 7 ft. centre, the centre arm being one foot out of line with the top and bottom conductor. Pin type insulators are used and forged steel insulator pins. All foundations are concrete, except for a few grillage footings, where the ground conditions warrant same.

The conductors consist of six 278,600 cm. aluminum cables, 19 strand. A $\frac{3}{8}$ in. Siemens' steel ground wire is

ences it was necessary to take every reasonable precaution to ensure continuity of service. For this reason it was decided to make arrangements whereby the lines could be cross connected between the power house and the city, so as to enable power to be brought into the city so long as any section of the line was in operating condition. To accomplish this a switching tower has been erected at Tyndall, some 30 miles east of Winnipeg, and the accompanying photograph

gives some idea of the structure. The location was chosen owing to there already being a small sub-station at this place which supplied power to the Garson Quarries and the town of Beausejour. The tower structure, which is of steel, is located on the right-of-way just outside of the sub-station, where there is always a man available. All four lines are brought through this tower and by means of switches almost any combination can be made quickly and without the pos-

twelve conductors under maximum loading conditions. Ample clearance between all live parts and ground is provided and ever precaution taken for the safety of the operator under the worst possible conditions.

Electric Furnace Development

The Electric Furnace Company, Alliance, Ohio, has just exported two of its electric melting furnaces to England. Both of these units are of the rolling mill type, arranged for direct pouring of the metal into molds. Johnson-Matt-hey & Company, Ltd. of London, England, purchased a 50 kw. Nose Tilting furnace, with hydraulic tilting mechanism—this furnace is 500 pounds hearth capacity, and is to be used for melting silver bullion. Allen Everitt & Sons, Ltd., Birmingham, England, have ordered a 125 kw. Nose Tilting type furnace; this furnace has 2000 pounds hearth capacity and is tilted by means of a motor-operated mechanism. This is the second "Baily" electric furnace to go into service in the oldest rolling mill in England, the first being used for melting pure copper, and the second furnace for melting 60-40 brass.

Letters patent have been issued incorporating certain individuals of St. Hyacinthe, Que., as the Aqua Electric Heater Company of Canada.

Lead Base Babbitt Metal is the title of a publication which is being distributed by the Westinghouse Electric & Manufacturing Company, announcing the placing on the market of lead base babbitt metal. The subjects discussed in this publication are overheating, bearing design, preliminary machining of shells, cleaning of shells, care of tinning alloy, tinning of bronze shells, tinning of pipe and malleable iron bearing shells, anchor holes in case iron bearing shells, care of the babbitted metal, cleaning solutions and materials. This is known as Folder 4474.

Niagara Falls Loses Taxes

The Ontario Railway Board has granted the appeal of the Hydro-electric Power Commission of Ontario against the assessment of the Ontario Power Company's property in Niagara Falls, recently taken over by the Commission. The assessment cut was from \$2,749,000. to \$2,666,625., which means that the income of the town is reduced by about \$100,000., or something over a quarter of the total tax income. It has been stated that the town will carry the case to the Supreme Court.

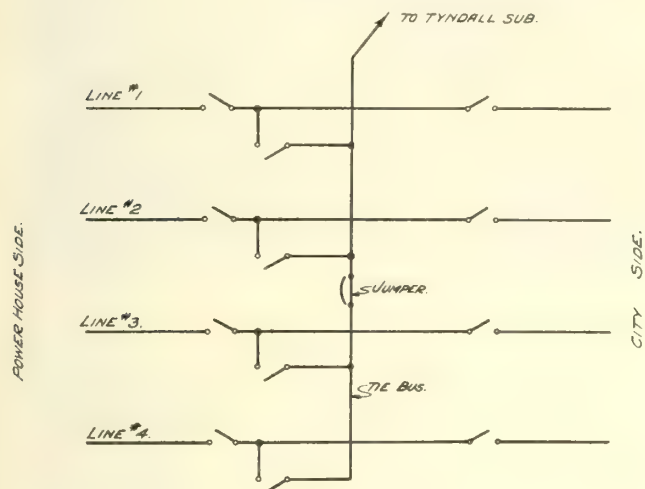
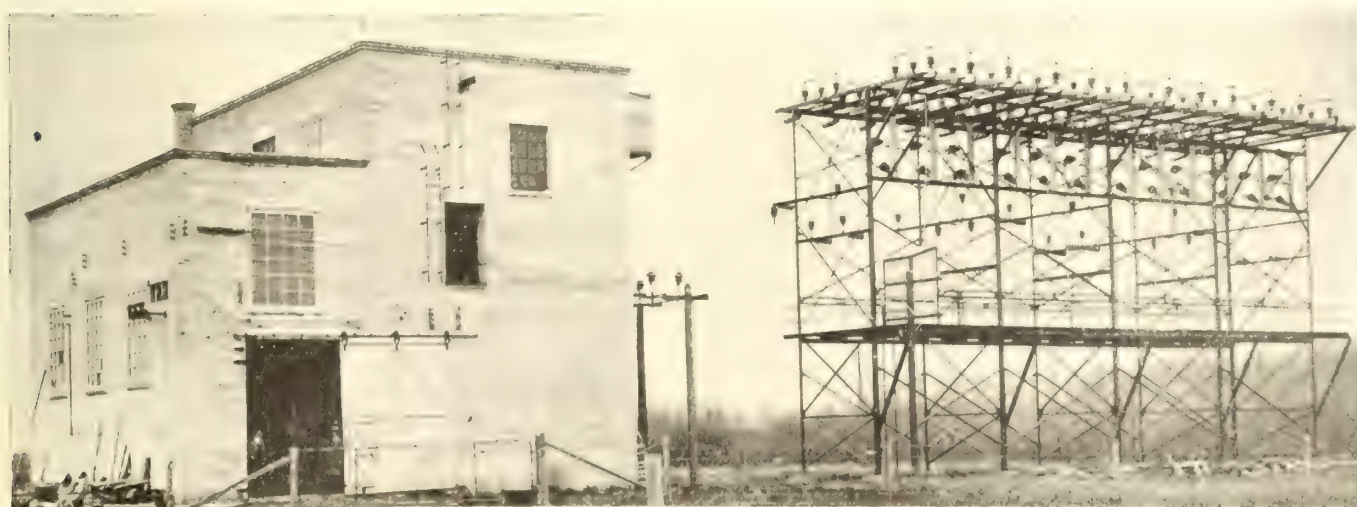


Diagram of switching tower connections of the Winnipeg Hydro-electric System.

sibility of mistake. The line diagram of the tower connections is shown in Fig. 2.

It will be noticed that the sub-station is supplied off the transfer bus. An operating platform is provided and access to same is obtained by a ladder to prevent the interference of unauthorized persons. All switching is done from this platform. A telephone booth, connected to the transmission line telephone system, is placed on this platform and is large enough and suitably built to allow of it being used by the operator as a shelter during inclement weather, while the line is being tested. Plank walks are provided on the top of the tower between the switches to allow the easy repair and inspection of same. The tower is lit by flood lamp, placed on the substation roof.

All line switches are of the vertical opening type, horizontally mounted, the transfer switch being vertically mounted. The tower is designed to take the dead end pull of all



Winnipeg Hydro switching tower and sub station at Tyndall, Man



Beamsville High School "Does It Electrically"—All traces of indigestion rapidly disappearing in this district

As the Twig is Bent, the Tree Inclines

Beamsville High School Obeys the Scriptural Injunction in "Train up a Child (Electrically) in the Way he Should go"

The Beamsville High School, opened about three years ago, is one of the most modern and well equipped of the rural high schools in the province. The accompanying cut gives some idea of the dignity and high character of the building and the impression given is fully sustained by an inspection of the interior. The Domestic Science Department is, however, of particular interest to our readers. A Homemakers Course, under the direction of Miss L. McLeod, covers two years' training in cookery, sewing, laundering and home nursing. As the district is particularly well served with electric power at very low rates, electrical household devices were adopted throughout. The photo shown gives a fair idea of the cooking room. It is equipped for 24 8-ampere, 3 heat table stoves; 2 24-ampere, 3 heat double hot-plate

table stoves and one type E. S. 65-ampere range with large oven 18 x 18 x 15" and total capacity of 4000 kilowatts. All stoves are of the McClary Mfg. Co. make. The electric wiring was installed by E. C. Farewell, of Grimsby. Mr. J. G. Adams is the principal of the school; Mr. S. J. Wilson, chairman of the Board. It was largely through the efforts of Mr. H. C. Robinson, Trustee, that the thoroughly modern equipment of the building was brought about.

During the past three years the attendance of the school has jumped from 35 to 150, a sufficient evidence of its popularity.

Current for light, heat and power is supplied by the Hamilton Cataract Power, Light and Traction Company.

The Colored 'Insert' on Pages 37-40 of This Issue is Designed to Help You with the Undecided Customers and Save Your Time and Theirs

The attention of dealers who are specially interested in the Christmas trade is directed to the four centre pages of this issue of the Electrical News which we believe can be used to advantage in helping the customer of uncertain mind, who is not able, under the circumstances to decide upon a suitable Christmas present. On one side of the insert is a classified list of suggested articles, comprising practically all the small electrical equipment at present on the market. On the reverse side of the insert there are illustrated a large number of the commoner appliances, from which probably 95 per cent. of all sales will be made.

Open the clips carefully and this insert can be removed without mutilation. The postal regulations require that these pages be bound in with the rest of the book, otherwise, we should just have inserted them as a separate sheet. We believe dealers will find these helpful for display on the counters, in their windows or elsewhere, and if other copies are required so that both sides may be displayed at the same time, we will supply them on request; no charge. For this purpose we have had printed, and are holding, a number of extra copies. Drop us a line on receipt of your magazine if you require extra sheets.

THE HAMILTON SPECTATOR SATURDAY NOVEMBER 19, 1921

"DO IT ELECTRICALLY"

TODAY we have gone one step further—we have dipped the climax. This year every Electrical Store will be the **REDAUERS SANTA CLAUSES**. They are going to give you the gifts in the most appropriate way, appropriate to the season, appropriate to the occasion. Also, they will give you the gifts in the most appropriate way, appropriate to the season, appropriate to the occasion. Also, they will give you the gifts in the most appropriate way, appropriate to the season, appropriate to the occasion.

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Electrical Alphabet

ABSOLUTELY FREE

Complete Set of Eureka Vacuum Cleaner
Attachment—Price \$10

With Every Purchase of the Grand Prize

EUREKA
ELECTRIC
VACUUM CLEANER

THIS FREE OFFER
Expires December 31

\$5 DOWN

CULLEY & BREAY

1411-1413 STREET WEST

Financing with Cash, Time, Trade

Financing with Cash, Time, Trade

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WIRE YOUR
HOME

FACTORY
FIGURES

John A. Dwyer

THORNTON

SCHWENGER

EVON

DIRECTORY

RELIABLE ELECTRICAL WIREMEN

BLADGEN

BRAY

AVIS & JERMY

Moffatts
ELECTRIC RANGES

Four Year

THE HYDRO SHOP CITY HALL
Hamilton

Let Niagara Do
Your Cooking!

THE NEWEST and most complete line of electric ranges, refrigerators, and other electrical appliances, at the lowest prices, at the City Hall, Hamilton. The City Hall, Hamilton, is the only place in the city where you can get the complete line of electric appliances at the lowest prices. The City Hall, Hamilton, is the only place in the city where you can get the complete line of electric appliances at the lowest prices.

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The City Hall, Hamilton, is

Electrical Pages are Splendid Mediums for Putting the "Make it an Electrical Christmas" Idea Across.
This Shows How Hamilton and Winnipeg are Going After Business.

The Electrical Contractor

Does It Pay to be an Electrician?

By MR. HERBERT C. POWELL

Statistician, Toronto Hydro-Electric System and Vocational Councillor, Central Y. M. C. A., Toronto*

This question will be discussed from several viewpoints:
First--the vocation and its possibilities.
Second--the economic returns.
Third--the life outlook.

The Vocation and its Possibilities

What is an "electrician?" The New Standard Dictionary defines "electrician" as: 1. One who is versed in the science of electricity, an original investigator of electrical phenomena; 2. One who invents, manufactures, furnishes or has charge of electrical apparatus. This definition, however, is not satisfactory, at least so far as the men in the trade understand it. My idea of an electrician is a practical mechanic who understands and practices the art of installing, connecting, operating and repairing electrical circuits and apparatus.

A first class electrician is expected to use his head in planning and discovering how to do a given job. He is usually told there is a job to do, and to go ahead and do it. He may or may not be provided with plans and materials, but usually he is called upon to work out his own plan and get the materials that he needs. He may not find suitable equipment or materials available, so he is expected to improvise or design and have made, equipment and materials to do the job. A repairman is expected to locate the trouble quickly and either remedy it at once or take action to have it repaired.

The electrician may be employed in various activities:—

Electrical contracting and repairing; plant and factory electrical construction and maintenance; electrical inspection; work in storage battery service stations; automobile electrical work; electric transmission and distribution work; electric railway work; electric meter work; telephone, telegraph or signal work.

Some contracting concerns may do electrical construction only, others electric repairing only, others merchandising only, or there may be a combination of any two or three of these activities. A concern may be very large, doing an extensive business in many parts or it may be a small corporation, doing business locally, or it may be a man in business for himself employing only a few men.

The merchandising feature is of growing importance. The association of electrical contractors and dealers covering Canada and the United States is rapidly developing higher standards of contracting and merchandising.

Some of the vocations in the contracting and repairing business are: (a) owners; (b) inside wiremen; (c) electrical mechanics; (d) estimators; (e) salesmen; (f) general repairmen; (g) armature winders; (h) battery men.

An electrician in the course of his duties may have to do many different kinds of jobs. He should have not only a good understanding of electrical practice, but a knowledge of machinery and manufacturing processes. A theoretical

*Before the Electric Club of Central Technical School

training and especially a good training in mathematics increases the possibilities of advancement.

Manufacturing Occupations

There are occupations in the electrical manufacturing industries which are almost wholly electrical, classified as follows:—

Engineering and drafting; coil winding and taping; coil impregnating and painting; coil placing and connecting; assembling; repairing; testing.

A young fellow who wants to learn the "electrical business" has several ways open to him:

(1) He may get a job as an electrician's apprentice in some shop which will take him on in that capacity. In Canada and the United States there are very few of such places in these days.

(2) The average fellow starts in some shop as a helper and during four or five years he picks up something of the trade and becomes a journeyman without a thorough knowledge of groundwork. He may drift around from shop to shop learning something at each shift. But this method is not as good as some others.

(3) The young man who can go through high school and then through college, taking practical work in shops during summer vacations, and after graduation taking a two years' student test course in some good electrical manufacturing concern, has an immense advantage over any other kind of training.

(4) However, if a fellow cannot get all of the above, he may go to technical high school as far as possible, then get a job with some reputable electrical concern doing good work, and take further technical school training at night.

Correspondence courses in electrical trades are good in the absence of technical schools provided the course is studied to completion. Every worker whether he be electrician or engineer should be reading the technical magazines on his specialty, and studying other branches of the business. The Public Library has usually on file representative magazines and the leading technical books either for circulation or for reference.

As the electrical business is not wholly technical, it is advisable for an electrical man to be studying not only the technique and practical methods of his specialty, but also the following:—(1) Elements of accounting, costs and estimating; (2) Modern production methods; (3) Properties of materials; (4) New types of machines and equipment; (5) Principles of selling and advertising; (6) Credits and collections; (7) Commercial law; (8) Office practice and business correspondence; (9) Labor matters and industrial relations.

The electrician should be constantly studying and improving. If he does not he will surely be left behind. The industry is advancing so rapidly that it demands technically trained as well as practically trained men. The law of the survival of the fittest is surely working in the electrical business. It may be but a short time before all electricians must be licensed according to law. This requires some technical training. A young man in the electrical business has no reasonable excuse for not taking advantage of the wonderful

facilities for technical training especially in the larger cities.

The Future of Electricity

The electrical industry has not yet reached anywhere near the saturation point; in fact, electrical service is being sold to less than one-third of the people in our land, and that is sold mostly for light. There is an intensive demand for electric heating and power for household purposes which is awaiting development.

There is a great future for the electrical industry. Other industries, which seem to have long ago reached the saturation point, have tremendous sales in volume and value, and are supplying almost entirely for replacement. For example, clothing, furniture, sewing machines, kitchenware, china, bedding, floor coverings, etc.

New uses for electricity are being discovered. Improvements in electrical apparatus are in constant process of evolution. Not only will the introduction of electricity to places where it was never before used bring increased business, but the replacements should result in tremendous sales as the years roll on.

Economic Returns

The second point of view in discussing this question is the economic returns. Most people find work by drifting into occupations of which they know nothing. Very many drift either into blind alley occupations from which there is very little opportunity for advancement or into kinds of work for which they are wholly unsuited and sometimes stay for life.

Boys are tempted by a high wage into jobs where there is little opportunity for promotion. The parents are often to blame in urging them to get the most money possible at the start. This is a great mistake. The occupations worth while are those where special training and skill are needed, and which usually pay low wages at the start, while learning the business.

Let us look for a moment at some of the important considerations in choosing a vocation. Some of these are set forth in Bulletin No. 1, "Vocational Opportunities in the industries of Ontario," published by the Ontario Government Department of Labor in 1920.

(1) Is the work of such a kind as to render the worker independent later in life?

(2) Will the occupation eventually supply adequate returns?

(3) What natural and acquired qualifications are needed in the different occupations.

(4) What are the opportunities for promotion or eventual proprietorship.

(5) In what ways are the conditions good and in what ways bad?

Let us try to briefly consider the occupation of electrician in the light of these five questions.

(1) A man can remain in the occupation of electrician till he is 60 or 65 years of age. He can become independent later in life only in so far as he saves a portion each year of his wages and invests it so it will bring in an income. The necessity of keeping your cost of living and your other expenses less than your income is particularly emphasized in this question.

(2) Will the occupation eventually supply adequate returns? The wages are usually low at the start because you start either as a helper or an apprentice and it is a job where you are learning something. The wages for a skilled electrician are among the highest of all the trades. The work extends throughout the whole year, there being no slack seasons as a rule. It is in a growing industry, new workers are required all the time, and really skilled men are scarce.

Some Statistics on Income

From data which I have been able to collect from various

sources, such as books, technical magazines and government publications, too numerous to mention, the following average incomes have been worked out.

In the central station industry, for the year 1919 in Canada, the average annual income for 9696 employees was \$1,068.00. In the United States, as a whole, in the central station industry, the average annual income for 1917 for 105,546 employees was \$902.00 and for 1919 is estimated at \$1,082. In Toronto, for 1919, the average annual income for electricians was about \$1,400.00 whereas in 1914 it was about \$950.00

In Canada, for 1918, government statistics show for 30 types of manufacturing industries, grouping all employees as follows:

75,198 employees on salary, average annual income \$1,430.

602,589 employees on wages, average annual income \$666.00.

The average annual income per employee on salaries and wages was \$989.00.

The highest average annual income per employee was \$1,570; this was in the melting industry. The lowest average was \$573.00, in the knitted goods industry. The 1919 average income for 158,777 employees on the steam railways in Canada was \$1,317.00 and on the electric railways in Canada the average was \$1,182.00. The averages for railways in United States work out about the same as for Canada.

I find the annual income of the first class electrician year after year is among the highest of all the trades. Some trades pay higher rates per hour, but the seasonal slack time brings down their average for the year.

Probably the highest annual income for a working electrician would be about \$2,500.00. For an electrical engineer, the average might be about \$2,500.00, but incomes go higher than \$10,000 per year.

(3) The natural qualifications in this occupation are as follows:—

(a) Good character—honesty, loyalty, obedience, courage, etc.

(b) To find a way or make one.

(c) Love of work, studious, desire to serve.

(d) Good judgment—commonsense, scientific attitude, foresight.

(e) Efficiency—getting things done quickly and thoroughly; endurance.

(f) Team work, ability to handle men.

The acquired qualifications are:—

(a) General knowledge of electrical circuits and apparatus.

(b) Ability to read drawings and blueprints and to lay-out accordingly.

(c) Ability to make calculations and to keep costs and records.

(d) A good training in machine shop practice, woodwork, metal work, pipe work, electric wiring, constructing, installing, testing and repairing electrical apparatus and equipment.

(e) Knowledge of inspection rules and regulations.

4. The opportunities for promotion or eventual proprietorship are very good. Many electricians go into business for themselves as electrical contractors. Some tackle the merchandising along with contracting. There are opportunities as foremen, superintendents and managers. A man must have special leadership qualifications for advancement. The outstanding characteristics of an industrial leader are:

(a) Physique. (b) Energy. (c) Thoroughness. (d) Observation. (e) Concentration. (f) Judgment. (g) Fairness. (h) Control. (i) Resourcefulness. (j) Knowledge.

Each one of these qualities may be systematically developed. A very good book for the executive is, "Developing

Executive Ability," by Gowin.

The functions of a foreman are:—To act as leader of his men (not a driver); to instruct and develop his men; to plan and organize operations; to supervise operations; to make improvements; to co-operate with the other executives and factors in the management.

Each workman or leader should get this great fact into his mind, soul and body, that he is working to make a profit for his employer and to give satisfaction to the customer. The employer, to get business has to charge prices in competition with others, and this means a very little, if any margin for profit. The only way to make a profit is to charge a fair, reasonable price and to keep costs below income. In order for an employer to get business at a fair price it is absolutely necessary for him to establish a reputation for doing jobs that give complete satisfaction. This means that each individual from the owner down to the lowest paid helper has got to do his level best in the team, each and all working for the success of the team. Each man's work must give satisfaction in order that the whole job will be satisfactory. Modern business is placing more and more emphasis on team work. And this principle of teamwork is just as fundamental in business, government, and life relationship as it is in sport. Any man who bucks an organization or another fellow, bucks himself. We get back what we give out, only usually in larger doses. The only way to real happiness and progress is service—doing your level best and helping the other fellow.

Arthur F. Sheldon restated a few years ago two old truths in his own words—"Confidence is the basis of trade," and "He profits most who serves best."

He Profits Most Who Serves Best

It would be well if all trade unions would carry out the principles of unity for which they stand, co-operating with the employers and with themselves to establish permanently in all business and working relations the ideal, "He profits most who serves best." So many men are making rods for their own backs, by laying down on the job, by not doing a fair day's work, by dishonest practices, and by not developing their talents to their highest degree. These men blame everyone but themselves for their hard luck.

If a man does not make a profit for his employer how can he ever hope to make a profit if he goes into business for himself.

Most men would like to be independent when they are 60 years of age. But some statistics show that only five out of every hundred men at the age of sixty are able to support themselves and families.

Statistics from another source are slightly more favorable. Out of an average group of 100 men starting out in life at the age of 25, the following facts show what happens to them at the age of 65,—36 have died; 1 is wealthy; 4 are well-to-do; 5 live on their earnings; 54 are not self-supporting.

These facts tell us that it is wise to make preparations early in life in saving money. By a combination of life insurance and select investments and by developing your talents so that they will earn more as the years go by, we can prepare for the remaining days on this earth.

5. Let us now answer the fifth question regarding good and bad conditions of the vocation of electrician. In the first place it is a very interesting business. You are dealing with one of nature's greatest unknown forces, of which scientists are discovering new things almost every day. There is always something unusual, uncertain, and changing. In the second place, it is a business that is noble and worth while. It brings freedom, comfort and happiness to people in every walk of life especially to the poorer classes. It provides light, heat, power, communication and health. In the third place, the conditions under which a man must work are improving. Factory and Compensation laws require employers to look after

the welfare and safety of employees. In the fourth place, the hours of labor are not long, usually eight to nine hours a day, with Saturday half-holiday.

The chief bad condition is the hazard of electric shock and burns. However, this is not as bad as it sounds, because statistics show that there are far more accidents from slipping, tripping and falling among electrical men than from electric shock or burns. With the vigilance of safety committees and the improved safety devices, electrical accidents are becoming rather scarce. And when an electrical accident does occur, it is usually because of the man's own carelessness in not using the safety appliances, or because he deliberately disobeys the rules.

Recent Contracts

Mr. Harry P. Oland, 110 Portland St., Dartmouth, N.S., has been awarded the contract for electrical work on a school addition to be built there at an estimated cost of \$31,000.

The J. Desand Electric Shop, 187 St. Paul St., St. Catharines, Ont., has been awarded the contract for electrical work on a new school to be erected on Facer St., St. Catharines.

Mr. F. D. Reaume, 1015 Wyandotte St. E., Windsor, Ont., has been awarded the contract for electrical work on a warehouse to be erected at 527 Arthur St. Windsor, for the Eaton Clark Company.

Messrs. R. A. L. Gray & Co., 85 York St., Toronto, have secured the electrical contract on a Club House to be erected on Centre Island for the Royal Canadian Yacht Club, of Toronto, at an estimated cost of \$55,000.

Messrs. Harris & Marson, 81A Parkway Ave., Toronto, have secured the contract for electrical work on a \$125,000 Nurses Home to be erected at the head of John Street, Hamilton, Ont., for the St. Josephs Hospital.

The Sayer Electric Co., 87 Bleury St., Montreal, has secured the contract for electrical work on a church recently erected at Bernard & Outremont Sts., Montreal, at an approximate cost of \$50,000, for the Temple Baptist Church.

Messrs. Douglas Bros., 2137 Yonge St., Toronto, have been awarded the contract for electrical work on a store and apartments building to be erected at Bowood & Yonge Sts., Toronto, for Mr. A. Beamish, 15 Sherwood Ave., Toronto.

Messrs. R. F. Wilton, Toronto, and Emerson Nichols, London, Ont., who formerly carried on an electrical business in the city of Toronto under the name of The R. F. Wilton Electric Company, have dissolved partnership. In future the business will be carried on under the old firm name by Mr. Wilton.

Messrs. Bates & McPherson, 33 Richmond St. West, Toronto, have secured the contract for electrical work on an addition being built to the W. C. T. U. Building, 20 Gerard St. E., Toronto, at an estimated cost \$125,000.

The McNaughton-McKay Electric Co., Windsor, Ont., has been awarded the contract for electric wiring on a cold storage plant being erected at Windsor, Ont., for The Essex Provision Company, Windsor, at an estimated cost of \$300,000. Also an electrical contract on an addition being built to Grace Hospital, Crawford and London Sts., Windsor, for the Salvation Army, at an estimated cost of \$150,000.

The electrical contract on the \$150,000 market building recently built at Windsor, for Messrs. Winter & Little of that place, has been awarded to the Iron City Engineering Company, of Detroit, Mich.

A feature of Electric goods, often overlooked, is that they are used every day in the year.

Electric Conveniences and Luxuries

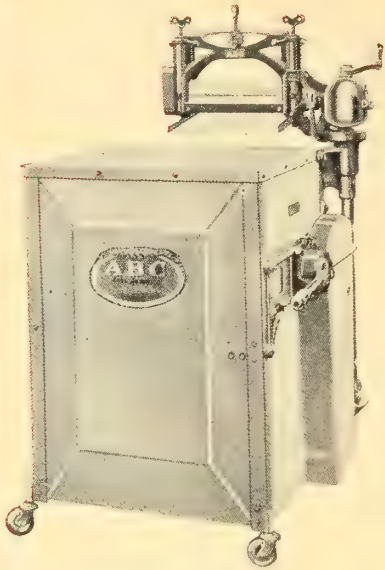
Alarm clock	Foot warmer	Portable radiant heater
Battery lantern	Hair drier	Reading lamp
Bed lamp	Hair waver	Reed or wicker portable
Candlestick	Hand lantern	Reminder clock
Chair lamp	Heating pad	Illuminated shaving mirror
Cigar lighter	Hearing devices	Shaving mug
Comb and curling ironer	Floor lamp	Shaving water heater
Curling iron	Illuminated pads and pencils	Silk lamp shade
Curling iron heater	Illuminated table ornament	Talking machine motor
Desk companion	Library lamp	Traveler's iron
Desk fan	Lighted aquarium	Traveler's companion
Desk lamp	Luminous switch plate	Traveler's stove
Electric fountain	Massage vibrator	Traveler's lamp, cord and plug
Electrically lighted wall mirror	Novelty electric candle	Vest pocket flashlight
Electrically lighted table clock	Oil lamp attachment	Watch case flashlight
Floral decorations	Lamp shades	Writing desk lamp
Flower basket	Piano lamp	

Invalid and Sick Room Comforts

Bath cabinet	Electrically heated garment	Motor chair
Bed lamp	Electrically heated pillow	Nurse signal
Body, joint and limb bakers	Foot warmer	Obesity apparatus
Candle or night light	Heating device	Sterilizer
Deodorizer	Heating pad	Therapeutic lamp
Ceiling clock	Medical battery	Treatment apparatus
Electrically heated blanket	Medical coil	Vibrator
Electrically heated cap	Medicator	Violet Ray apparatus
	Milk bottle or food warmer	

Electric Automobile Fittings

Battery lamp	Garage and tire pumps	Pocket testing meter
Clock	Garage portable lamp	Signal gloves
Foot warmer	Headlight dimmer	Spark plug
Lamp kit	Headlight glare diffuser	Spark plug intensifier
Signal bell	Headlight voltage regulator	Spark plug tester
Signal lights	Hydrometer for battery testing	Steering wheel warmer
Trouble lamp	Inspection lamp and magnet	Spotlight
Cigar and pipe lighter	Limousine annunciator	Storage battery
Electric horn	Limousine cluster light	Storage battery tester
Electrically heated gloves	Limousine telephone	Vulcanizer
Engine and radiator heater	Limousine radiator	



Washing machine



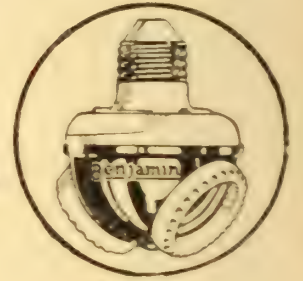
Ironing machine



Water heater



Range



Two-wire



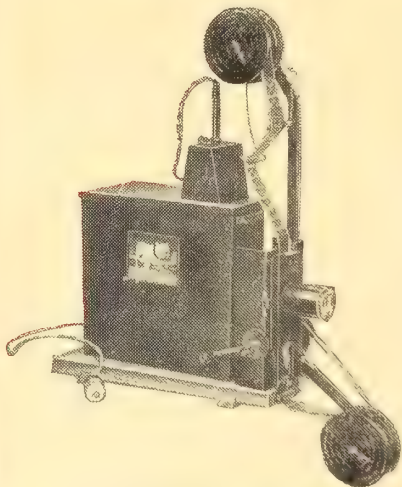
Soldering Iron



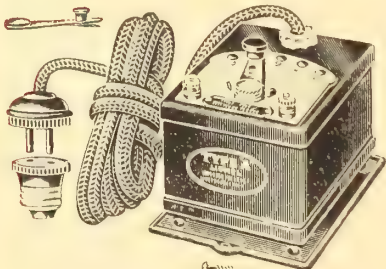
Railroad accessories



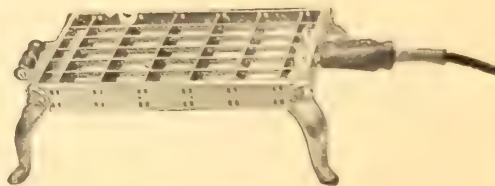
Wireless equipment



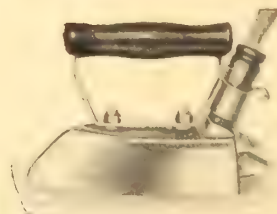
Moving picture machine



Transformer



Toaster stove



"Glad" Iron



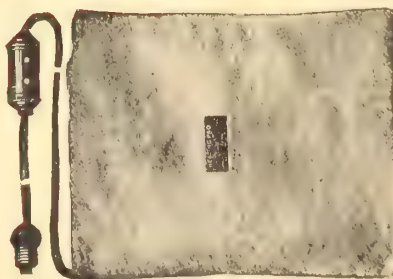
"Through" switch



Fan



Hair dryer



Warming pad



Percolator



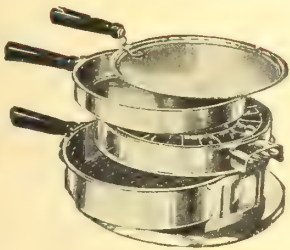
Single element stove



Two element stove



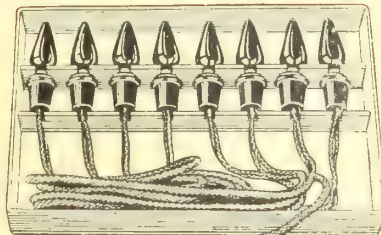
Electric
ELECTRIC SERVE
 THEM. They
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Grill



Vibrator



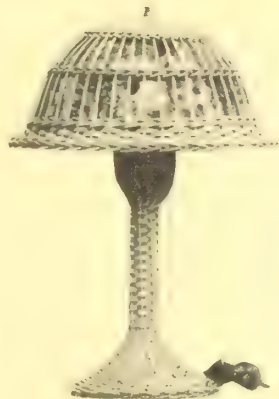
Christmas tree lamps



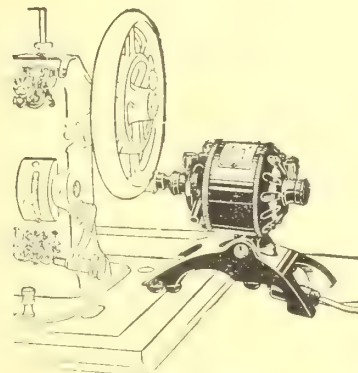
Floor lamp



Washing machine



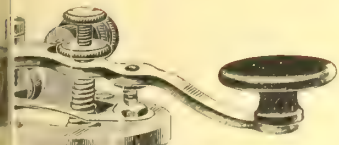
Wicker lamp



"Sew" Motor

ants

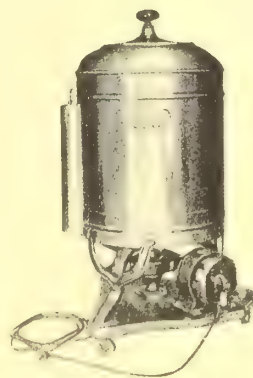
EVERY ONE OF
labor, create leisure
r. These gifts bring
n life.



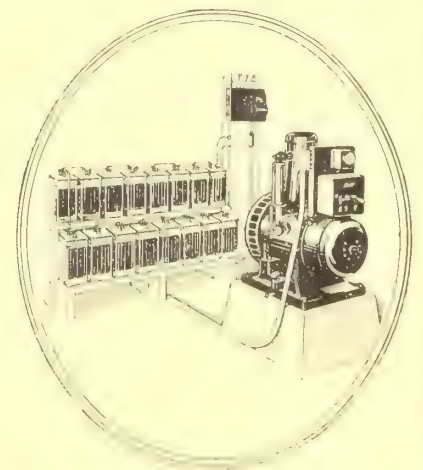
graph equipment



Portable motor



Dishwasher



"Your Own" electric plant



mp



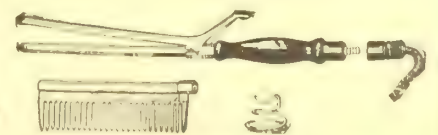
Ice cream freezer



Flash lantern



Dim-a-lite



Curling tongs & comb



Chafing dish



Flashlight



Train

A list of Electrical Items suitable for Christmas Presents for every member of every family.

General Servants in the Home

Electric heating pad	Fruit and vegetable peeler	Table cooking set
Bell ringer	Frying pan	Table lamp
Bath heater	Fumigator	Tea ball pot, kettle or urn
Cereal cooker	Gas lighter	Tea wagon, electrically fitted
Casserole	Griddle	Toaster
Chafing dish	Hand lamp	Toaster-stove
Chocolate and cream warmer	Hot closet	Utility motor
Electric churn	Hot plate	Vacuum cleaner
Clothes drier	Ice cream freezer	Waffle iron
Clothes washer	Illuminated porch number	Water purifier
Coffee grinder	Immersion electric heater	Water heater
Coffee percolator	Iron	Water kettles
Combination cooker	Ironing machine	Wired dining table and other furniture
Corn popper	Lemon squeezer	Appliance cord suspender
Cream whipper	Meat chopper	Isolated plant
Dish washer	Meat slicer	Dim-a-lite two plug sockets
Disc stove—one element	Milk warmer	Air heater
Disc stove—two elements	Plate warmer	Electric grate
Drink mixer	Radiator	Candlestick adapters
Egg boiler, cooker or steamer	Range or stove	Perfume burners
Electrically heated blanket	Refrigerator	Luminous Pendants
Egg Tester	Regulating lamp or socket	Intercom. telephones
Electrically heated faucet	Sauce pan	Samovar
Fan	Wired serving table	Hair dryer
Fireless cooker	Sewing machine motor	Electric clock systems
Food warmer	Sewing machine portable lamp	Electric fireless cookers
Fruit juice extractor	Stew pan	Floor lamps
	Sterilizer	

Mostly for the Young People

Aeroplane	Electric railway outfit	Bicycle lighting outfit
Automobile	Steam engine and dynamo	Canoe lamp
Circuit breaker	Telephone	Electric candle
Crane and hoist	Thriller magneto	Christmas tree lighting outfit
Dynamo	Electric train	Bird, fruit and nut lamps
Electric boat	Transformer	Miniature incandescent lamps
Electric engine	Trolley car	Electric scarf pin
Electric range	Books on electricity	Battery fan
Fan	Picture and post card projector	Horseshoe magnet
Ferris wheel	Motion picture machine	Magnet charger
Utility motor	Shock coil	Telegraph instrument
Hydro-electric generator	Battery	Wireless telegraph instruments
Lamp post	Battery lantern	Wireless telephone equipment
Electric locomotive	Flashlight	Baby flatiron
Motor and countershaft	Electric fountains	Nursery light
Power station	Pistol flashlight	Baby washing machine



BETTER MERCHANDISING



IT looks as if we were over the worst. We don't hear that word "rotten" nearly as often as we did. Price of bonds and stocks going up—a sure forerunner, it is often said, of trade revival. The boys are beginning to smile again. All we need now is a little "pep." The Christmas trade will put us solidly on our feet if we handle it right.

¶ *If the dealer sells, the jobber and manufacturer are prosperous and the working man finds employment—to buy again from the dealer. It's a belt-line arrangement but the dealer is the motive power.*

¶ *Start to-day—dress your store, your window, yourself—for Big Business. Advertise. Enthuse your staff. For the next three weeks put on every pound of pressure your boilers will carry.*

¶ *We can—if we WILL—make the Christmas bells ring out the joyous message, "We Do It Electrically—Merry Electric Christmas."*

"Ladies' Night" at Toronto Branch, Ontario Association of Electrical Contractors and Dealers

The regular monthly meeting of the Toronto Section of the Ontario Association of Electrical Contractors and Dealers was held in Bingham's, on Friday evening, November 18. This meeting had been designated "Ladies' Night," for the wives and lady friends of the members of the Association were invited to take part in the proceedings. In taking this course, the Toronto contractors and dealers were merely recognizing a fact we too often overlook, namely, that if the use of electricity is to be popularized in the home and office, it is the women who occupy those homes and offices who should be told about the advantages of electricity and its labor saving, comfort giving qualities.

The routine business was easily disposed of and then Mr. Frank T. Groome gave a very interesting and complete talk on the elementary features of good lighting. Taking as his subject "Illumination and Light Control", he first defined the three terms, "candle power", "foot candle" and "lumen", preparatory to emphasizing the necessity for proper distribution of light. The properties of light rays in mediums other than air were next described and demonstrated by a few simple but very interesting experiments. He spoke of the properties of absorption, possessed in a high degree by some types of glass and in a much smaller degree by other types. The laws of reflection were also explained and illustrated. The diffusion qualities of different glasses were shown, particular mention being made of "Sol-lux", a product recently placed on the market by the Jefferson Glass Company. Interesting experiments also showed the action of light rays impinging upon lenses at various angles. By means of Holophane glassware of various shapes, Mr. Groome demonstrated how the glass manufacturer is utilizing these various laws in producing efficient, restful illumination in place of glares and eye strain.

Glare

The necessity for proper protection of light sources, and proper control of light rays was demonstrated. It was shown by experiment, that glare prevents the eye from seeing when less light, properly controlled, gives perfect illumination.

Another experiment showed the relation between illumination and what might be called "the speed of vision". An inscription on a cylinder revolving in dim light was not readable; with increased illumination the cylinder seemed to slow up very materially. This delusion, however, was due entirely to the fact of greater speed of vision. Mr. Groome drew the conclusion that work in a factory, for instance, would be automatically speeded up by increasing the intensity of proper illumination.

Intensity of Artificial Light

It was explained that over illumination by artificial light is practically not obtainable if the light sources are so arranged as to prevent glare. While it is quite true that the modern incandescent lamp gives out in the neighborhood of 700 times as many units of light as the old oil lamp did, still this is as nothing compared with the intensity of sunlight, and we can increase the intensity of illumination very materially beyond our present standard without danger of eye-strain, resulting in an increase of efficiency in the individual, if we are just careful to properly control and distribute the light rays.

Window Lighting

Mr. Groome, with the assistance of Mr. Geo. J. Beattie and his X-ray window reflectors, had fitted a miniature store window in such a way as to demonstrate the various

methods of window lighting. There is no excuse to-day for badly lighted windows, for the equipment on the market is so efficient that light may be controlled, without difficulty, to concentrate the attention of the passersby on whatever part of the window it may be desired. Mr. Groome regretted—and we all do—the large percentage of horribly lighted store windows in the city of Toronto—a condition not entirely absent in the windows of some of the contractor-dealers themselves.

Some particularly good examples were given of the relations between light efficiencies and proper maintenance of the lighting units. By replacing old lamps, cleaning the reflectors and adjusting the position of the units, etc., the amount of illumination on the working plane could be frequently increased over 50 per cent.

Lighting and Accidents

Passing reference was also made to the relation between insufficient lighting and accidents. Mr. Groome showed a curve of accidents in a number of industrial plants which indicated clearly that as the days shortened in autumn the number of accidents increased, reaching the maximum point about the first of January and gradually diminishing during the next three or four months.

An interesting demonstration was also given to show the different types of street lighting. Reflectors are now available which distribute the light in a horizontal plane instead of, as formerly, in a more or less spherical direction. The speaker explained the difference between what he termed the illumination and the silhouette effect, explaining that the former was much less likely to result in accidents to pedestrians, motorists and others using the streets.

In conclusion, Mr. Groome explained the simple form of foot candle meter which is now available for testing the illumination at any point. This is an instrument that every contractor and dealer should carry with him. It has done a great deal to stop guesswork in illumination, and if conscientiously used will become a very important factor in convincing the public that their lighting is not what it should be.

Mr. Groome's talk was a great success, as well as a great pleasure to all who heard it. The projection lantern and the moving picture machine have reached such a state of perfection these days that the value of actual demonstration has almost been lost sight of.

A feature of the evening's entertainment that was very much appreciated and enjoyed by the members and their lady guests was the singing of Mrs. George Cross.

Following the lecture, adjournment was made to the dance hall upstairs. With the exception of a single complaint, lodged by one of the fair guests, that the gentlemen had, evidently, concentrated on their electrical education to the exclusion of other things which she considered—at the moment—equally important, one o'clock found everybody happy and perfectly satisfied that the "Ladies' Night" had been an entire success.

Windsor District Activities

The Windsor District Section of the Ontario Association of Electrical Contractors and Dealers held a meeting November 1st at which the following members were appointed to office: Executive Committee,—Messrs. V. B. Dickson, of the Barton Netting Company; F. Garfat, of the Electric Supply Company, and F. D. Reaume. Mr. V. B. Dickson was appointed District Chairman and elected representative on the Provincial executive committee, and Mr. A. H. Cook was appointed secretary treasurer. A number of winter activities and the Licensing Act were discussed.

Window Cards Will Help to Deliver Your Christ- mas Message

Have you noticed how dealers in other lines of trade value the window card? The head of one of the biggest electric stores in Toronto remarked this to the writer a few days ago, and added that the electrical dealer doesn't seem to have caught on to these little kinks yet. We illustrate a half-dozen suggestions on this page of quite attractive window cards. These cards don't cost much, yet add very considerably to the value of a window or store display. Further than that, they represent one of the best means of making people think about electrical goods. They give the pedestrian a new idea as he passes your window, and thus save valuable time for both of you.

These cards also can be so worded as to give the passersby a fairly liberal education in electrical matters. We must not forget that to 95 per cent. of the people on the street, electrical appliances, and what they will do, is a closed book.

A show card need not be elaborate to be attractive. Simplicity, with many people, is the most effective. A seasonable illustration, however, in addition to the printed message will generally be desirable.

A few other suggestions are offered which may help the busy dealer to arrive at a proper and effective wording for his own cards. Keep this one point prominently in mind—make them "human." Don't worry about having them high sounding or grammatically perfect. Just see to it that they make the appeal that causes the reader, if he doesn't buy at once, at least to go away "thinking."

For a wireless set—

Ask your son what he thinks about it.

For a toy washing machine—

Have you someone in your home about 10 years old?

For an electric range—

Santa Claus himself uses one.

For a toaster—

Do you know the difference between Electric Toast and all other kinds?

For a vacuum cleaner—

Now, honestly, Sir,—Did you ever use a broom, yourself?

For a washing machine—

The washboard is more antiquated than the tallow candle.

For a percolator—

The best stimulant the law allows.

For an ironing machine—

Give mother an occasional afternoon off.

For a dish washer—

Ask any woman what she dislikes most in household work.



Buy
**ELECTRIC
GOODS**
at
Electric Stores



An Electric
**CIGAR
LIGHTER**

Is Just
the Gift
He'd like.




Wouldn't a
**TOY
ELECTRIC
TRAIN**

Make the
Youngster
your Friend
for Life...



**A Vacuum
CLEANER**

*The gift that adds
to the joys of
Christmas and
afterwards —*



Gift The
Electrical

*That Appeals
Because it
is different.*



**A
Flashlight**

*Is a
Gift*

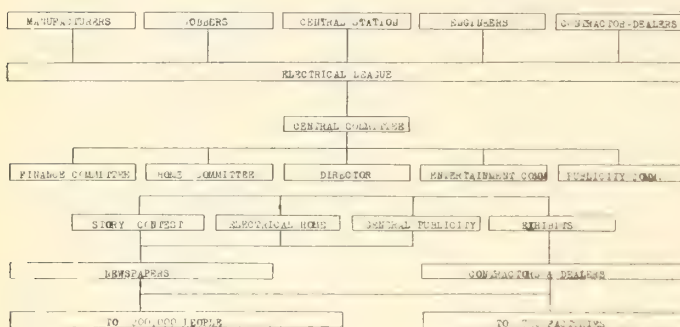
*That
a man
will
Appreciate*

Hamilton Leading the Way in a "Do It Electrically" Campaign

The city of Hamilton seems to be leading all competitors these days in merchandising activities. In our last issue we reported the success of a splendid dinner meeting held on November 2. Organization in Hamilton has now taken the form of The Electrical Development League, the purpose of which is to promote sales and educate the public to "Do it Electrically."

The outstanding feature about this League is that all the various interests are working together as a unit. The privately-owned central station company, the municipally-owned hydro system, the manufacturer, the jobber, the engineer, the contractor and the dealer—they have all merged their varying interests for the purpose of achieving

HAMILTON'S ORGANIZATION PLAN



the one common aim—to increase sales and educate the public in the use of electrical equipment. The campaign that is being put on by the Electrical Development League is in the hands of the most capable men available. W. H. Childs, assistant manager of the Hamilton Hydro-electric System, is chairman and has associated with him, on the executive, Louis W. Pratt, sales manager of the Dominion Power & Transmission Company, and V. K. Stafford, consulting engineer. Mr. Stafford has been named "director" of the campaign—another good omen for its success. The various committees have been named as follows:

Publicity Committee:—T. F. Kelly, sales manager Hoover Suction Sweeper Co. Ltd., Chairman; Geo. Foot, sales dept. Canadian Westinghouse Co; L. W. Pratt, sales manager Dominion Power and Transmission Co; R. Farr, manager Electric Dept., Arcade Limited.

Finance Committee:—J. Culley, Culley & Breay, chair-

man; W. G. Jack, Jack Bros. Electrical Construction Co; W. H. Childs, Hamilton Hydro Electric System; L. W. Pratt, Dominion Power & Transmission Co.; J. Daly, Northern Elec. Co. Ltd.; Geo. Foot, Canadian Westinghouse Co.

Electric Home Committee:—Godfrey Hughes, district manager Canadian General Electric Company, chairman; G. W. Arnold, manager Boston Insulated Wire Co; T. S. Turnbull, sales manager Tallman Brass & Metal Company; E. S. Jefferies, electrical engineer Steel Co. of Canada, Ltd.; T. F. Kelly, sales manager Hoover Suction Sweeper Co. Ltd.; L. W. Pratt, Dominion Power & Transmission Co.

Entertainment Committee:—J. Daly, district manager Northern Electric Co., chairman; R. W. Dewherst, sales manager Standard Underground Cable Company; W. W. Chadwick, manager Chadwick-Carrol Brass Co.

Arrangements are being made by the Publicity Committee to advertise to make 1921 an "Electrical Christmas". A "Story Contest" will be started in the immediate future.

Kitchener Branch Meeting Weekly

The contractor-dealers of Kitchener, Ont., are now holding weekly meetings and have an active program planned for the winter season. At their meeting on November 21 a number of committees were appointed, including Finance, Contractors' Cost Data, Advancement of the Industry and House and Entertainment. These committees will study the different matters allotted to them and present reports at the regular Monday evening meetings. By dividing the work up in this way, the Association felt that a lot of time would be saved and duplication of effort avoided. At this meeting a vice-chairman was appointed and it was arranged that the chairman will conduct the first and third meetings of each month and the vice-chairman the second and fourth.

Smith & Stone, Ltd., electrical manufacturers Georgetown, Ont., are gradually adding to their list of manufactured lines, which includes sockets, receptacles, lamps, rosettes and cutouts of various types. The illustrations show two of their devices. They claim to be the only Canadian manufacturers of this type of cutout. The porcelain current tap was recently approved by the Hydro-electric Power Commission of Ontario.

Power installations and industrial lighting will be given special attention by Mr. C. L. Dowsley, who has just opened an electrical business at 1320 Granville Street. Mr. Dowsley has had considerable experience in Vancouver prior to this present venture as a contractor-dealer.



Did you ever see a more Co-operative looking body of Electrical men? This was the City of Hamilton on Nov. 2 preparing to say "Merry Christmas" Electrically.

You Judge a Man's Character,
Very Largely, by His Face

The Face of Your Store is Your Window

And Passersby Judge Your Store and It's
Ability to Give "Service" by it's Appearance

In New York City there is a retailer who pays five thousand dollars a month for a little room on Broadway about the size of an ordinary "hen coop". On the mere basis of floor space the charge is outrageous, but tens of thousands of people pass the place every day. This fact governs its rent value. It's got "location"—which is a very important factor in the success of any retail business.

Have you ever figured out your "window circulation"? How many people pass it every day? How many stop and look at your display? How many stop, look—and enter? Location is a big asset, an almost invaluable one, but it is not everything. It's not the number of people that pass that puts money in the till, but the number of people that enter. And the percentage of the passers-by who come right in is determined, largely, by the pulling power of your window displays.

Again and again we have spoken to dealers about their publicity and the almost unanimous verdict is this: "Oh, yes! Our newspaper advertising has proved an excellent investment—but, after all, it's the windows that pay best." Always keep that in mind: Your windows are your most effective medium of publicity. It's your displays that give the value to your location. How careful then should the dealer be about the trims he puts in his windows—about the expression he puts on the face of his store!

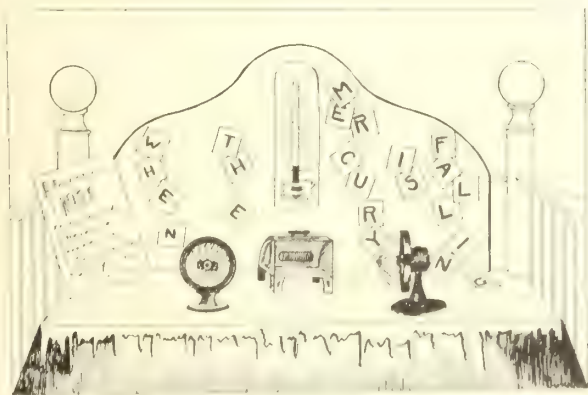
There is one golden rule of window trimming, one gauge to test the worth of any scheme of display, namely this: The purpose of the window is to sell goods. Obvious enough, you say—but strange as it may seem there are many who apparently don't realize it. Some have the mistaken idea that they have the responsibility of presenting artistic creations to the community, and others think it their duty to hit the

public between the eyes with fearful and wonderful novelty stunts. It's good business to make one's window as neat and attractive as possible, and there's no harm in introducing an element of surprise now and again,—provided your decorations and your stunts direct attention to the goods and not from them. But just think now: Haven't you yourself stood among a crowd of others looking at a freak window display and then gone away ignorant both of the name of the store and the goods it carried. That sort of advertising is a waste of effort and money, and window space. Your trims should be as original and distinctive as you can make them, but the whole purpose and idea of them should be to present the goods as effectively as possible to the passing public.

Two cuts are shown herewith illustrating suggestions for window displays. These embody the principle we have been trying to bring out. They are a little different from the usual, but their novelty of arrangement does not merely attract attention to itself, but directs it to the merchandise.

These trims would be quite simple to work up, and the materials are few and easily secured. In the one case, a Christmas tree with a colored lighting outfit and some red twine to string from the tree to the articles displayed, together with the small cards on which the notations "For Mother", "For Father", etc., are shown, comprise the equipment.

In the second suggestion, a large size thermometer, some cards for the lettering and artificial frosting is all that is required, outside of the sheet of beaverboard to which to attach the thermometer and the lettering. A display of this kind, when the thermometer is disporting itself around zero will sell portable electric heaters.



Window Display Suggestions—Don't Overcrowd—Attract and Educate at the Same Time

Electric Appliances Make Possible the Eight-Hour Day for the Housewife

Here is a schedule which has been in use for some time in a modern electric home in Winnipeg. It is arranged for a family of five:

7.30 to 8.00—Prepare breakfast; put clothes to soak (Monday).

8.00 to 8.30—Serve breakfast. Make coffee at table in electric percolator. Make toast at table on electric toaster.

8.30 to 9.00—Clear table, wash dishes in machine, brush up dining-room and start clothes to washing in machine.

9.00 to 10.00—Monday—Wash clothes and put on line. Wash curtains of one room each week.

Tuesday—Iron clothes with electric ironer and electric glad iron.

Wednesday—Clean second floor including windows of one room each week. Use vacuum cleaner.

Thursday—Clean silver, icebox and cabinets.

Friday—Clean third floor and basement.

Saturday—Clean first floor, including kitchen

10.00 to 10.30—Marketing.

10.30 to 11.00—Rest and read newspaper.

11.00 to 12.00—Tidy bedrooms and place in fireless cooker any foods for dinner requiring long slow cooking.

12.00 to 12.30—Prepare luncheon.

12.30 to 1.10—Serve luncheon.

1.10 to 1.30—Clear diningroom and wash dishes in dishwasher.

1.30 to 5.00—Recreation (Two afternoons each week devoted to sewing).

5.00 to 6.15—Prepare dinner.

6.15 to 7.00—Serve dinner.

7.00 to 7.30—Clear table, wash dishes, place cereal in fireless cooker.

3 hours total

A Reader's Viewpoint on "Who Should Sell Isolated Plants"?

Editor Electrical News,

The article with the above heading in your issue of November 1st is very appropriate at the moment.

Answering your question, it seems to me that the successful merchandising of the farm lighting plant calls for an educational campaign, just as the self starter on the automobile has necessitated since its inception.

Ten years or so ago the automobile electric starter was put on the cars by the manufacturer who left the onus of proper upkeep, maintenance and worry (and there was plenty of it in the early days) to the owner who worried along and obtained his parts and repairs from a very limited source.

As the self starter has gathered popularity and has become an essential part of the car mechanism, the car distributor, dealer and garage have by a process of learning familiarized themselves with this important piece of apparatus, so that now-a-days one can scarcely fail to get new parts and repairs from any reliable concern interested in the automobile trade.

This same progress has been made in other lines of auto accessories, such as tires, storage batteries, etc.

So with the farm lighting plant. The manufacturer must create the interest with the distributor, the electrical contractor, the dealer, and the farm machinery agent, and if each in their turn "do their bit" the building up of sales should not prove difficult or burdensome.

Farm machinery agents of which there are thousands in Canada) provide a very desirable medium for digging

up prospective business, as they are usually in direct touch with the farmer and his needs. But is it not too much to expect the farm machinery agent to sell the farmer unassisted? He is usually not possessed of any technical knowledge that often helps along a sale, neither is he in a position to talk wiring and fixtures and electrical appliances.

The co-operation must, therefore, come from the distributor, contractor, or dealer, who must obtain his fundamental "sales effort" from the manufacturer.

Selling farm lighting plants is not necessarily a specialty business. It is a business that every electrical contractor and dealer should cultivate.

They have much to gain—and little to lose—because it is economically impossible for the manufacturer to reach the user direct.

The distributor or electrical contractor entering into the farm lighting business for future profits, co-operating and aiding the small dealer and farm machinery agent, spreading the gospel of "Electric Light and Power" amongst the farmers, will find great possibilities for increased electrical merchandise sales with compensating profits.

The field is very fertile in Canada—a great chance for the salesman—and the business in sight is well worth the pains and effort.

Very truly yours,

Albert E. Wilkes.

Big Field for Small Motor Driven Devices in Machine Shops

A number of small motor driven devices in constant daily use in very plant, factory and industrial enterprise is continually on the increase. The demand for auxiliary helps to workmen such as grinders, drills, saws, trimmers, etc., is growing rapidly.

A count was recently made of the of small motor driven devices in a little plant employing only ten or twelve people. Seven fractional horse power motors were found, all running important machinery, each piece of which was a time and labor saver.

Take the matter of grinding tools. Go into almost any big machine shop and unless it is equipped with modern grinding apparatus you will nearly always find from three to six workmen standing around the grinding equipment all waiting for an opportunity to grind their tools, or to have someone grind them. While they wait around the grinder production ceases. Expensive machinery waits idle for the want of a sharp tool.

The production manager who refuses to put in modern grinding machinery makes a grave error, because for the sake of saving a few dollars he slows up production from a machine costing thousands of dollars—perhaps several such machines are all idle at one time for the lack of proper grinding facilities. Portable grinding equipment or bench grinders placed at convenient points throughout the shop would save thousands of dollars annually in production costs, time, labor and idle machinery.

Small motor driven devices in the factory have an infinite variety of uses. Their utility is almost endless and the field is only half worked at present. Time will come when almost every important workman will be "self contained". That is, he will have at arm's length all the necessary devices to help him carry on his work with the greatest efficiency. Many of these devices will be motor driven.

Some of the most common machines are:

Bench Grinders, Blue Printing Machines, Drill Presses, Filing Machines, Forge Blowers, Folding Machinery, Hack Saws, Oil Extractors, Punches, Portable Drills, Perforating

Machines, Riveting Machines, Saw Setters, Tool Post Grinders, Saw Trimmers.

Of course there are countless other machines which are in daily use that are motor driven. We mention only a few of them here in this limited space.

During the next few years the problem of production at low costs is going to be one of the greatest worries of the manufacturer. As we all know, the frenzied buyer's market permitted loose, expensive production but with conditions just the reverse, production costs must be reduced in all lines. The production man in every factory will be directly responsible for the sales of that factory, because if he cannot turn out his product at a fair price, in line with competition, he will find his sales department unable to dispose of his products.

Motor driven, time saving devices, that add to the production of a plant, will go a long way towards cutting production and manufacturing costs.

Electric Service League of British Columbia

The Advisory Council of the British Columbia Electrical Co-operative Association at an open meeting held on the evening of November 3rd, 1921, decided to change the name of the organization to the Electrical Service League of British Columbia. The reason for this change was the possible misunderstanding of the term "Co-operative Association" in the mind of "the man on the street", who may be inclined to associate the activities of such an association with the activities of a co-operative buying or price fixing organization. It was further felt that the similarity between the name of the central station company and the co-operative association might be harmful to the activities of the association.

The new name of the organization, "Electrical Service League of British Columbia", follows the precedent set in the



Mr. Rey E. Chatfield, Secretary-Manager, Electrical Service League of B.C.

Pacific Northwest. The activities of the organization under the new name will continue as before, but it is hoped the new name will express to the public more nearly the real purpose of the organization.

The McDonald & Willson Lighting Company, 309 Fort St., Winnipeg, has been awarded the contract for electrical work on an addition being built to the Rice Knitting Mills factory, Selkirk & Austin Avenues, Winnipeg.

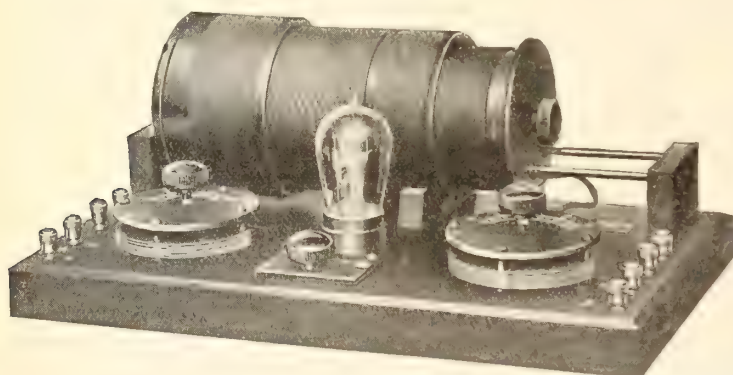


Bird's eye view of plant of English Electric Co., of Canada, St. Catharines, Ont.

The Newest in Electrical Equipment

Gilbert-Menzies Wireless Receiving Set

Right in the city of Toronto there are more than six hundred amateur wireless sets. For the more advanced operator the Gilbert-Menzies Co. are now offering their No. 4015 receiving set. This set is a combination of a detector and a set of sensitive tuning coils augmented with two variable condensers. It is particularly adapted for advanced amateurs and professional use in receiving both wireless telephone and telegraph signals. Waves varying in length from 200 to 2500 meters, may readily be received. The receiving range for wireless telephone is set at 500 miles, but we find in a great many instances that this figure can be greatly exceeded. The receiving range for wireless telegraph signals is practically unlimited. They have used the sliding type of tuning coils in this set, believing this method to be the simplest and most effective in tuning in for wireless telephone and wireless telegraph work. The coils are wound on strong



forms impregnated and baked. They slide with a free motion on two brass rods. Included with the set is a pair of very sensitive 2000 ohm receivers and improved head band.

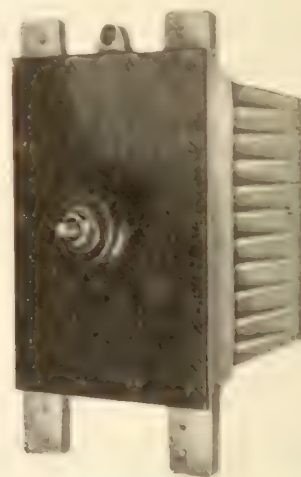
The set is mounted on a wood base 14¾ in. by 9½ in. All wood parts are finished with an attractive highly polished dark mahogany stain. The knobs are made from specially prepared black composition, and the binding post, switch levers, screws, and nuts are all of brass. They have carefully protected the wiring on the bottom of the set by setting in a board which entirely covers the wiring; this board however, may readily be removed. The set is carefully assembled and wired by expert workmen trained in assembling wireless apparatus. The only additional equipment necessary is one set each of A and B batteries, and one vacuum tube. The cut shows the set connected ready for use. Complete directions and diagrams for connecting and operating accompany the set.

Dubilier Mica Condensers

Dubilier mica condensers for wireless are now recognized as a valuable achievement in their field. The U. S. Navy and Army are said to use them almost exclusively, and they are also displacing other types of condensers in the amateur and commercial field. This condenser is noted for its combination of high potential, high efficiency, uniform capacity and minimum space requirements. It has tinfoil plates with the very finest clear ruby India mica as dielectric. By means of a vacuum process of eliminating all air and moisture from the surface of the plates, and by using tremendous pressure, very intimate contact is obtained between the tinfoil and the mica, resulting in a large capacity in compar-

ison to the size of the condenser. The sectional method of construction makes possible very high voltages without subjecting each unit to a greater strain than with low potential. In the case of power condensers official tests have shown the losses to be of the order of ½ of 1 per cent. The method of applying the pressure gives a fixed capacity whether the condenser is idle or loaded; this is especially valuable where it is desirable to keep the characteristics of an electrical circuit uniform. The construction prevents brush discharge and the formation of ozone at high voltage. Aluminum cases protect the condenser units from mechanical injury. There is practically no temperature rise.

There is a type to suit every requirement whether ama-



teur or commercial, high power or low power. Type CD158 is used as a transmitting condenser with spark sets using in the neighborhood of 500 watts. It is tested at 18,000 volts, and is furnished in a capacity of 0.004 mfd. Type 577 is a receiving condenser admirably suited to amateur requirements. It is tested at 1,000 volts and furnished in capacities ranging from 0.0002 mfd. to 0.01 mfd. The Canadian General Electric Co. has exclusive manufacturing rights for Dubilier condensers in Canada.

Simple Form of Thermo-phone

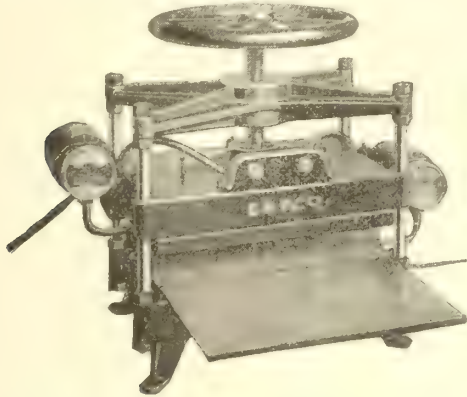
This cut shows the "Kidphone," actual size, weight one-quarter of an ounce. It is a simple form of thermo-phone, having neither magnet nor diaphragm. The talking elements are tiny loops of wire enclosed in a small air chamber



and connected with the transmitter and battery the same as in the electro-magnetic receiver. This is said to be a very practical telephone receiver. It is manufactured by the Thermo-phone Company, Bedford St., Boston.

Electric Stamp Vulcanizer

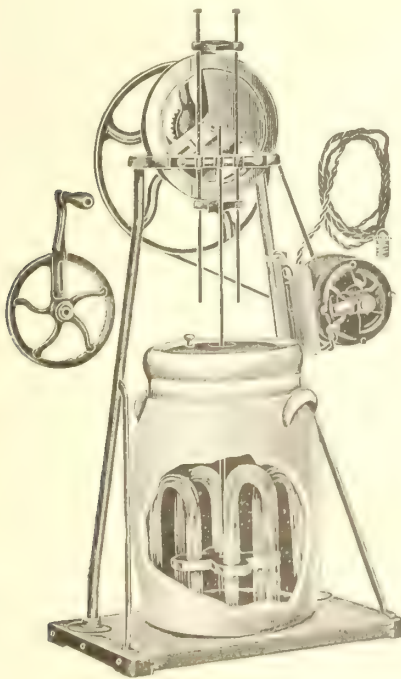
An automatic electric stamp vulcanizer is now being manufactured by the Automatic Electric Heater Company, Warren, Pa. A special feature is the individual heat controls for the upper and lower platens, by which a uniform result may be obtained. The units cannot burn out from overheating because these controls are automatic. Starting with the vulcanizer cold it takes about twenty-five minutes



to bring it to the desired heat of 280 to 300 deg., at which point the electric current is automatically turned off. When cooled a few degrees the current is automatically turned on until full heat is regained, then shut off again. Just enough current is used to maintain the heat at correct operating temperature. There is no waste of energy and it is claimed that its operation is so simple that even an apprentice can produce good results.

Another Labor Saver

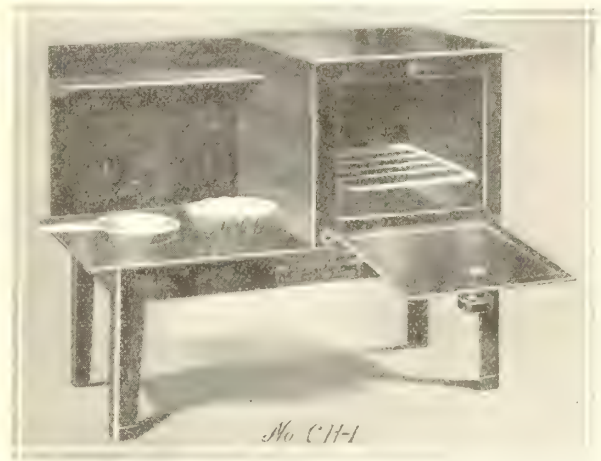
An electric churn is one of the most necessary items on the farm. The Hydro-electric Power Commission of Ontario reports that some fifty extra rural routes are being added to their lines as fast as they can be installed. This



means that every farm on the line will need a churn that operates by electricity. This type is manufactured by the Taylor Bros. Churn & Manufacturing Company, of St. Louis, Mo.

A Range like Mother's

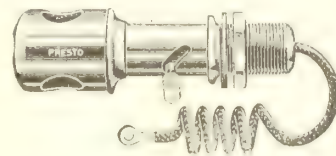
A real electric range—not a toy, except in size—is shown herewith. It is just like mother's—or like mother's ought to be if the electrical dealer has been sufficiently aggressive



in mother's home. It has two hot plates and an oven and the kiddie can cook and bake to her heart's content.

Dash Lamp for Fords

Every owner of a Ford car will be delighted to know that a good dash lamp has been put on the market, which can be easily and quickly applied by anyone; no mechanic or electrician is necessary, as there are no wires to be cut or spliced. The illustration shows the extra long threaded shank with nut and washer, which permits this lamp to be applied on either an all-metal dash, or on a wood dash, metal covered, by simply boring a $\frac{3}{4}$ -inch hole in the dash, inserting the shank of the lamp, and tightening up the nut at the back. A sufficient length of cord is furnished with clip, ready to slip



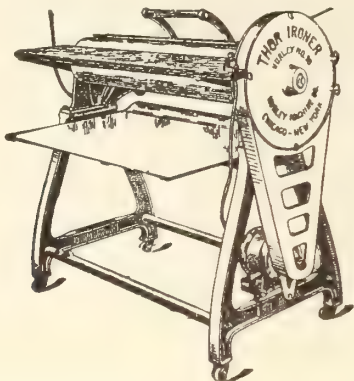
over the tail light terminal connection on the back of the lighting switch on the dash, to make one side of the circuit. As the lamp is single contact in construction, the other side of the circuit is, therefore, completed through the rigid metal contact of the lamp flange with the steel dash or metal covering of the wood dash. The lamp is equipped with individual lever switch—positive in action, durable and easy to operate—and threaded into a solid brass sleeve; made of heavy brass throughout, nickel plated and hand polished. Manufactured and marketed by The Metal Specialties Mfg. Co., Chicago, Ill.

New Cora-Lites Catalogue

A handsome booklet, "Cora-Lites for Commercial Lighting" has just been issued by the Consolidated Lamp & Glass Company of Coraopolis, Pa. This catalogue has 24 pages 9x7 inches, with the Cora-Lites illustrated in full colors. The catalogue is a handy reference for a man showing a light fixture to a customer. It contains a large number of illustrations of the latest in lighting fixtures, and a list of the various types of lamps and fixtures. Dealers may secure a copy of this new booklet by addressing the Consolidated Lamp & Glass Company, Coraopolis, Pa., or R. E. Davis, 113 Wortley Rd., London, Ont.

The Thor Ironer in Winnipeg

A demonstration of the Thor Electric Washer and Ironing Machine has just been made in the appliance department of the Winnipeg Electric Railway Co., under the management of John F. Chilcott, special sales representative of the Hurley Machine Co., Toronto. The demonstration created much favorable comment, and was a revelation to the public. The many uses to which the ironing machine could be put to were



demonstrated, every conceivable article being put through the machine, with the open end roll. The simplicity of operation was shown, and those who witnessed the demonstration were surprised to find that material of any thickness was run through the heavy ironing shoe, which was automatically held against the roll, with no effort other than guiding it through. Mr. Chilcott reports very satisfactory results from his visit to Winnipeg.

Tell Them the Price

Every prospective customer wants to know the price of the article he is interested in and, generally speaking, he doesn't want to ask the salesman. You know, yourself, that the reason you very often go to a departmental store is so that you can look around, read the prices on the articles without attracting attention and, in a general way, be left alone to make up your own mind. The other point about the



department store, of course, is that when you really do want some information you can't get it.

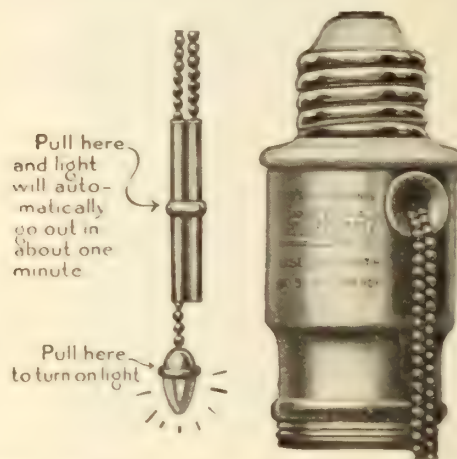
It is pretty generally considered now-a-days that every article on display should show the price, and there are many ways of doing this. A tag has a provoking habit of turning its back on you so that you have to take hold of it to see the figures; this action generally causes a salesman to swoop down on you.

One of the neatest price marks we have seen is shown in this illustration. It has a celluloid frame, very neat, stands

only about five inches in height and is inconspicuous enough that it does not detract from the article to which it refers. It is made by the Western Novelty Manufacturing Company, of Cleveland, Ohio. The figures are printed on a slip of cardboard, which is easily removable.

The Light with a "Time Limit"

If you have a habit of loitering at bed-time, here is exactly the article that will cure you. The manufacturer calls it "The light that stays lit." It might be termed "The light that goes out." Whatever you name it, it will be the real thing for making you hustle into bed after you pull the string, for the lamp stays lit just one minute. The manufacturer also points out that the advantages of such a light will be readily apparent to anyone who, in the sudden darkness, has stumbled over a rocking chair as he groped for the bed. The time-delay result is accomplished by a thermo-



static switch mechanism which performs the function of a spring latch that when cool, is positioned to hold together two ordinary spring leaf contacts but when heated, move slowly to a position of releasing the contacts and permitting them to snap apart, as in the ordinary switch. The heating of the thermostat is accomplished by pulling the socket chain. This socket is manufactured by the Tremont Products Company, 216 High St., Boston, Mass.

Buy
Electric Goods
in
Electric Stores
and get
Service

Feature it in your advertising



The Future of Railroading is Electrification

BY W. R. STINEMETZ*

Manager Heavy Traction, Railroad Department, Westinghouse Electric and Manufacturing Company

While today electrification is classed as desirable, we believe that the future will find it considered as one of the necessary factors for successful railroad operation.

Transportation is one of the essentials of national growth. It is just as necessary to the progress of a nation as an abundant water supply is to the welfare of a community. The increasing demand of man for comfort and luxury constantly requires more traffic units to serve. The savage can tote all of his requirements on his shoulder. The requisites of modern man are drawn from all corners of the globe.

Our railroads have been the advance guard of national expansion and as such have been compelled to struggle for an existence while the country was building up around them. Some railroads may have been built speculatively and with poor judgment, but most of them have had a constant struggle to keep abreast of the demands of modern life. They have grown from single track lines with infrequent and light traffic, in some cases to four track lines with the heaviest equipment and service obtainable.

Railroading in the past has been more or less of a hand to mouth existence. This is a very unfortunate situation. No family, community or association can survive on a haphazard basis. It was only recently that the public began to realize what an important factor transportation has become in the life of the community. This realization of the seriousness of the railroad situation and its influence in the daily life of the people has created a very lively and beneficial public interest in this problem.

We all hope to advance, we expect to grow industrially, we aspire to improve in civilization. To accomplish these we must make our transportation system ready to carry the burden. What are we now doing to fortify the railroads to match industry. Surely we all realize that when transportation halts, industry is paralyzed with startling rapidity and appalling cost. We cannot afford to be any other than forehanded in this essential. It is much better to be in some cases over built than to pay the awful cost of unpreparedness. Why not wake up and plan for the increase of traffic which is inevitable.

Needs Under-estimated

Almost every former attempt to visualize facilities in the States has been under-estimated. The size of trains and power of locomotives have constantly increased in an effort to keep up with the demand. Terminals have been built and stations provided which are often proven inadequate by the time they are completed. It is such conditions that Electrification can successfully meet and solve by permitting of a more intensive use of the present facilities.

The application of Electricity to the needs of railroads

has barely begun. It has been applied from time to time as a means of solving some difficult local operating problem and each time has demonstrated its suitability. In no case has it been taxed to its limit and wherever applied more reliable operations and improved service have resulted. This has been accomplished in spite of the fact that the steam engine to be replaced is a highly developed and efficient machine, while the electric engine and system have been in a state of evolution.

In each case we have applied that class of apparatus most suitable and available at the time. We quite often find these applications questioned from the viewpoint of later development, but the fact that they have been successful in supplanting steam operation, even though in a partly developed state, is sufficient justification.

Some of these applications have been handicapped by the newness of the tool. An improper understanding and appreciation of its virtue has resulted in a lack of administration, at times resulting in high maintenance; but even in these cases it has paid.

From an operating standpoint electrification has reached the stage of acceptance as a desirable, reliable and economic form of motive power, and where we can couple with this a saving in natural resources, such as available water power, as against coal or oil, we have the reason for the present world-wide interest in electrification.

Activity Abroad

This condition exists in France, Japan, Switzerland, Italy, Brazil, Sweden and Chile, and in all of these countries an active program is being carried out. Most of these countries had their transportation systems badly crippled during the great war by scarcity of coal, and in some cases the impossibility of obtaining a supply at any price. All are now developing their hydro-electric projects, even under the present disturbed market conditions. France has estimated that by the electrification of her three principal lines, involving 5280 miles of track, she will effect an annual economy of 1,500,000 tons of coal. The large amount of water power available in the Alps and Appenines has caused Italy to lay out a program of electrification embracing 1800 miles of road. In Sweden the program calls for the expenditure of approximately \$12,000,000 during the next few years. Japan has a definite plan with hydro-electric power for electric operation during the next five years of from 500 to 700 miles of main line, and has already ordered trial locomotives. Last year the Paulista Railway in Brazil started an electrification program with about 73 miles of track and 16 electric locomotives. It is logical that they should arrange to utilize in the future the abundant native water power after their recent experience when compelled to go back to the burning of wood in locomotives on account of shortage of ships to import coal. The government of Chile with similar conditions has just placed a \$7,000,000 order with the Westinghouse International Company for complete electrification of their important trunk line between Valparaiso and Santiago. This work will embrace about 200 miles of track and include 39 locomotives.

In talking with my friends today on my first visit to Canada the thought naturally occurred to me as to how you can use your water powers in connection with the electrification of railways. Some day you will develop your water

*Before Canadian Railway Club, November 8th, 1921.)

powers more fully, and the sooner you do it the more money you will save.

In the States this incentive is not so prevalent, due to the abundance of coal in the regions of heaviest traffic. Electrification is being studied more with the idea of improving operation and thereby eliminating the necessity of additional capital expenditures for greater trackage facilities. Its application has come where the greatest local advantages could be obtained. In many cases this application has only been partial, and the combined steam and electric operation has restricted the economies which would have resulted from complete electric operation.

Electrification In Long Tunnels

Probably the most important of such applications has been the introduction of electric operation in connection with long tunnels. Here the question of ventilation was a positive restriction on the intensive use of the entire railroad plant. The Hoosac Tunnel of the Boston and Maine Railroad, the St. Claire Tunnel in Canada, and the Simplon Tunnel in Switzerland are the most prominent examples of such application.

The electric locomotive can furnish unlimited power in the form of speed to expedite traffic over heavy grade sections. This characteristic of the electric locomotive has resulted in saving heavy capital expenditures for additional trackage, and, coupled with regeneration, has added materially to the safety in operation when descending these grades. The Norfolk and Western Railway is now handling with electric locomotives over their heavy grade division more than double the traffic, with much less congestion than they formerly experienced with steam.

The Norfolk and Western modern Mallet compound superheating steam engines, equipped with all improvements except feedwater heaters, require 5.4 lbs. of coal per drawbar horsepower when operating under their road conditions, and allowing for standby losses. With electric operation about 3.3 lbs. of coal are required per drawbar horsepower which gives a direct saving in fuel of 40 per cent. The saving in crew cost due to the additional work which the electric engine can perform in a given time, has been stated to be between 35 and 40 per cent.

Terminal Facilities

Another application has been effective in meeting the increasing requirements for terminal facilities. The use of multiple unit electric trains greatly relieves terminal congestion by eliminating switching and making up of trains, common to steam practice. It permits the more intensive and elastic use of terminal facilities, in built-up communities where real estate and trackage rights are difficult to obtain.

This is demonstrated by the results achieved by the Pennsylvania system in electrifying their main and branch line suburban service out of Broad Street Station, Philadelphia. This station was originally designed to handle 160 trains per day, but traffic has now reached a total of 600 trains daily, even though many trains have been diverted from this terminal. It would have been very expensive, though hardly practical, to have enlarged this terminal due to the valuable buildings and property surrounding it.

Aside from the great capital investment saved by this electrification, the following lesser economies were cited as having been effected.

Economies Effectuated

(1) Due to the less movement being required for electric M.U. trains, because steam locomotives do not have to be cared for and gotten to and from the round house, the capacity of the throat tracks feeding the station has been increased considerably, which increase was required by the traffic.

(2) The steam locomotives formerly handling this ser-

vice have been released.

(3) The locomotives handling facilities at West Philadelphia which were over-crowded have been relieved of congestion and their necessary expansion deferred.

(4) The fireman required in steam service is not needed on the M.U. trains.

(5) There is no doubt some saving in coal.

(6) The service is more reliable, quicker, cleaner and more attractive. Schedules are more closely adhered to, all of which has helped to build up the suburban communities served, thus increasing traffic.

(7) Because suburban trains run more nearly on schedule, they do not interfere with the through trains, and a higher main line track efficiency results, with less train delays.

(8) The smoke conditions in the city district have been materially improved.

Not all of the above are readily convertible into dollars, but they nevertheless exist and amount to real economies in the broader sense.

All of our large cities, due to their rapid expansion, are now confronted with the problem of congestion in local transportation. They have built electric surface lines, elevated tracks and subways, but always the demand seems to be a little ahead of the facilities. Have the railroads done their part in solving these problems? Would, not terminal electrification, by permitting a more continuous use of local trackage, not only create additional local travel which could be profitably handled, but also relieve the congestion on the street car lines during the heavy rush hour period?

A Case of Conservation

The most prominent case in America of electrification for the conservation of natural resources is that of the Chicago, Milwaukee, and St. Paul Railway. It is doubtful whether electrification of this long, single track system with limited traffic would have been justified had it not been for the cheap power available from hydro-electric developments. With this saving in power cost to carry the capital expenditures, electrification has enabled this road to capitalize the many minor advantages of electric operation such as improved service, especially in cold weather.

With the new electric passenger locomotives put in service a year ago, the Milwaukee make a 440 mile run with one engine. During the stop at Deer Lodge, the midway point, only the engine crew and train crews are changed. The locomotives are taken off for shop inspection after mileage varying from 3000 to 5000 miles, which means an inspection every eight or ten trips. Under this operation these locomotives have been making records from 10,000 to 11,000 revenue miles per month. This again is an example of intensive use of facilities.

There are two objections often advanced to electrification; one is the cost, and the other is the fact that the details of type and system have not been fully developed and standardized. Electrification is expensive but in no case has it failed to at least carry the capital charges where applied. The situation is a parallel to industrial application, where electrification has virtually supplanted all other forms of power. New tools are always expensive, and electrification is a new tool, but you can get with it that which you cannot obtain with any other tools. If we are to keep abreast of the times we must spend money. The proper units must be provided for the future, regardless of the cost, otherwise we shall be restricted in our industrial growth and social development, to avoid which almost any price would be cheap. Does any railroad lay a double track because it will pay for itself at once? Could some of the larger systems justify their revisions of grades and curves on the basis of savings? No terminals, or change of route, or grade

revisions are expected to pay for themselves on current business, but are built for future expansion.

Can't Wait For Standardization

If we were to hesitate for the objection of final development, we would halt all progress. Standardization is a good thing after development has reached that stage which permits of its most economical application. Standardization, however, which will retard development for some other selfish purpose is undesirable. Have the railroads standardized their steam locomotives today? They have been building them for nearly a century. We are not yet ready to handicap the developments of the future with standards which are only a measure of our present ability. Any attempt at standardization which will tend to limit this growth of the application of electricity, such a system or frequency, is not only an injustice to the coming generation of engineers, but it will in the future be swept aside if necessary by advancing science. What we should do in planning for the future is to capitalize the experience of the past and so arrange our program that we will not be handicapped by future requirements and developments. Electrification has not yet reached its ultimate development, and the future possibilities in its use for railroads present a picture of expansion and application which could not have been visualized a few years ago. The future will no doubt bring many developments in the electric control of power to trains and in communication between trains. Radio devices will enable the dispatcher to not only communicate with, but to control the movement of the train.

One thing which is absolutely certain is that the railroads are going to live and expand. This expansion is going to be largely in the form of betterment in operation and service, rather than in physical dimensions. This will require an increase in efficiency of movement, as well as economy of operation, and a more intensive use of present facilities. The present thought seems to be that this will be accomplished largely through heavier trains and higher speed and continuous movement using more efficiently the trackage which at present exists. This will involve the concentration of large power to constantly moving trains. Electricity is the most flexible and economic means of transmitting power yet discovered. This flexibility will permit the railroads to adjust the transfer of power to meet the constantly changing conditions, and to always adapt it economically to the growth and movement of traffic. Already industrial companies are developing this power and arranging distribution systems which will make it readily available to the railroads. Electricity has already solved the problem of the economic transmission of heavy power over great distances for all other purposes. Railroadings is no different from any other type of transmission. If it is, it differs only in that it is a more difficult problem, and therefore should have the use of the most flexible medium possible, namely, electrification.

The paper was illustrated with a large number of slides showing different types of trains and locomotives, terminals, lines, and equipment.

Mr. Williams, of the engineering staff of the Chicago, Milwaukee and St. Paul Railway, described the two electrified sections of that system. He stated that the operations had proved economical in comparison with the operations by steam locomotives. The speed of the trains and freight cars had been increased, train equipment decreased, operating staff reduced, and terminal work lessened. While experience showed that on these two sections electrification had proved economical, he desired to add that, speaking generally, electrification of railways must be carefully studied before it was undertaken, for the reason that the work was costly. It was better to use power from an established hydro-electric development than to construct a plant for special use in con-

nection with railway electrification.

In the course of a brief discussion, Mr. John Murphy, of the Department of Railways and Canals, commented on the waste involved in the use of coal for power purposes. This was one very strong reason for developing our water powers.

Replying to a question as to the limits of the third rail as compared with catenary equipment, Mr. Stinemetz pointed out the dangers attached to the use of the third rail, especially in railway yards. There was a general opinion in favor of overhead equipment, as it was impossible to put in high voltage on the ground, owing to the danger.

Chili Electrifying

Chile, the South American republic, known to most of us as a land of saltpetre and other minerals, has decided to electrify some of her steam railways. The electrification covers 144 miles and calls for an initial contract of \$7,000,000 for equipment, which is being supplied by the Westinghouse Electric & Manufacturing Company. The maximum grade over this distance is 2.25 per cent. A relatively large number of curves are encountered, the maximum being 10 degrees. There are six tunnels ranging up to 1,600 ft. in length.

Three thousand volts direct current has been decided upon as best suited to the conditions. Hydro-electric power will be used and construction is already under way to utilize the waters of the Rio Colorado. The generating station will contain three 8125 kv.a. units. This power will be transmitted 37 miles by double circuit, 110,000 volt transmission lines. Generation will be 3-phase, 50 cycles. This line will tie in with two other hydro-electric stations of the same characteristic, making a total capacity of 120,000 kw.

The power supply will be distributed by five sub-stations, designed to handle a train movement 50 per cent greater than the present time. Each station will contain, initially, two 2000 kw. motor-generator sets, each set consisting of a 2800 h.p. driving motor and two 1000 kw. 1500 volt generators, connected in series. Sub-stations 1 and 5 will take power at 12,000 volts; numbers 2, 3 and 4, at 44,000 volts.

Thirty-nine locomotives are included in the initial electrification, including 6 express passengers, 11 local passenger, 15 road freight and 7 switching locomotives.

Japanese Railway Activity

An indication of the improvement in business conditions in Japan since the 1920 critical financial stress of that country is received from the recent placing of an order with the Westinghouse Electric & Manufacturing Company for sub-station material amounting to \$76,000. This order covers the complete equipment for two sub-stations and includes 8 rotary converters, 12 transformers, 2 complete switch gear equipment, and station lighting transformers. Other large orders for railway material recently have been placed in this country by the Seto Electric Railway Company, the Bisai Electric Railway Company, the Nagasaki Electric Railway Company, the Tokio Municipality and by other large Japanese railway operating companies and municipalities.

A \$7,500,000 issue of 7 per cent sinking fund gold bonds, series "A," of the Manitoba Power Company, Ltd., are being offered by Messrs. Nesbitt, Thomson & Company, Montreal. These bonds mature in 20 years from November 1, 1921, and are guaranteed by the Winnipeg Electric Railway Company. They are secured by a first mortgage on the Manitoba Power Company's new hydro-electric plant at Great Falls, Man.

Current News and Notes

Aneroid, Sask.

The Saskatchewan Gazette announces the incorporation of The Electric Light & Power Company, Limited, with head office at Aneroid, Sask. The new company is capitalized at \$7,500.

Cap de la Madeleine, Que.

The Northern Electric Company, 121 Shearer St. Montreal, has been awarded the contract for a fire alarm system in Cap de la Madeleine, Que.

Dartmouth, N.S.

Mr. W. P. Beazley, Portland St., Dartmouth, N. S., has been awarded the electrical contract on a \$30,000 church being built in Dartmouth for the Roman Catholic congregation.

Fredericton, N.B.

The city of Moncton, N. B., has made application to the New Brunswick Hydro-electric Commission for the supply of 4,000 h.p. of electric energy from the Musquash plant. The commission has made a favorable report to the Provincial government, and fixes the rate at \$38. per horsepower per annum. It will be necessary to construct a transmission line between St. John and Moncton.

Hamilton, Ont.

Automatic Appliances, Ltd., as announced in a recent issue of the Canada Gazette, has been incorporated. The new firm is capitalized at \$60,000 and its chief place of business will be Hamilton, Ont.

Mr. T. J. Murphy, 241 Robert St., Hamilton, Ont., has been awarded the contract for electrical work on a church building at Herkimer & Locke Sts., Hamilton, that is being altered into a school at an estimated cost of \$49,000 for the Separate School Board of that city.

Kenora, Ont.

A party of engineers is reported already at work at the White Dog Rapids preliminary to active construction, which it is hoped to carry forward early in the spring of 1922. The White Dog Rapids are situated on the Winnipeg River and will be developed by the Backus-Brooks Company.

London, Ont.

The Public Utilities Commission, of London, Ont., of which E. V. Buchanan is general manager, is contemplating installing an ornamental street lighting system. Prices and information on such equipment are being asked for.

The Bowley Electric Co., 306 Dundas St., London, Ont., has secured the contract for electrical work on a building on Queens Ave., London, which is being altered for doctors' offices at an estimated cost of \$10,000.

Montreal, P.Q.

The gross earnings of the Southern Canada Power Company during October amounted to \$67,577.68 and show an increase of \$6,071.07 compared with the corresponding period last year. Net earnings totalled \$34,293.93, an increase of \$7,254.96.

The Crown Electric Co., 194 Ontario St., Montreal, has secured the contract for electrical work on three stores owned by the Laura Secord Candy Studio, Montreal, which are undergoing alterations.

North Regina, Sask.

The village of North Regina, Sask., will be supplied

with electric light service by the city of Regina, an agreement to this effect having been closed recently. It is understood power will be supplied to the village in bulk on one meter at the regular rate for large consumers, plus 25 per cent. The village will be required to deposit the cost of the work in the bank in advance and to enter into an agreement protecting the city against extensions without its consent.

Ottawa, Ont.

Mr. E. Headley, 645 Echo Drive, Ottawa, Ont., has been awarded the contract for electrical work on three residences being erected at Driveway & Frank Sts., Ottawa, for Mr. W. H. Lee, 59 Glen Avenue.

Pt. Arthur, Ont.

Port Arthur Public Utilities Commission, sold more power during October than in any other month in the history of the city, according to figures given out by Manager M. M. Inglis. During the month the Commission sold 10,000 horse power, as compared with the sales for the same month of 1916 of 2,300 horse power. The Commissioners are extremely gratified at the showing of this utility.

Point Grey, B.C.

The Active Electric Company, 597 Howe St., Vancouver, B. C., has secured the contract for electrical work on a \$25,000 residence being erected at Angus & Crescent Aves., Shaughnessy Heights, Point Grey, for Mr. F. M. Kelly, 367 Water St., Vancouver.

Saskatoon, Sask.

Mr. H. Lambert, 501 Avenue "J" South, Saskatoon, Sask., has secured the contract for electrical work on the undertaking parlors of G. H. McKague & Sons, recently erected on Third Avenue S., Saskatoon, at an approximate cost of \$20,000.

St. Hyacinthe, Que.

The Canada Gazette announces the incorporation of The Aqua Electric Heater Company of Canada, Limited. The company is capitalized at one million dollars; head office, St. Hyacinthe, Que.

Toronto, Ont.

The Toronto Transportation Commission is curtailing construction work. Five hundred men being laid off recently.

Three Rivers, Que.

The North Shore Power Company, Three Rivers, Que., has secured the contract for electrical work on the \$50,000 office building of the St. Maurice Lumber Company, Three Rivers.

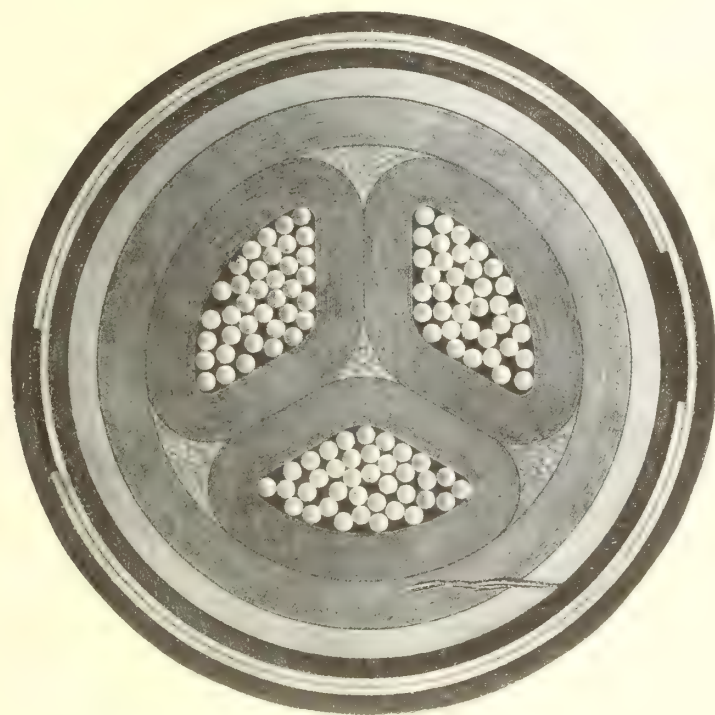
Winnipeg, Man.

The Wheaton Electric Co. Ltd., Winnipeg, have removed from the corner of Portage Ave. and Notre Dame Ave. to a more spacious show-room located at 318 Donald St. Winnipeg.

William Scott, late of the Winnipeg Electric Railway Co., having spent over two years in the Sales Dept. of the company, has been appointed western manager of Dawson and Co., Montreal.

Messrs. Gamble and Willis have opened an electrical store located at 306 Notre Dame Ave., Winnipeg. Prior to moving into the city they were located in St. Vital, a suburb of Winnipeg.

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350,000 C. M. 3-Conductor 12000 volt
Paper Insulated, Steel Tape Armoured Cable

Overall Diameter—3.62 ins.

*Built to Specification of Hydro-Electric Power Commission
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Eugene F. Phillips Electrical Works, Limited
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*The Oldest and Largest Manufacturers of Bare and Insulated Wires and Cables
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POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 652, Electrical News, Toronto. 17-1f

Electrical and Mechanical Engineer, with long experience in construction and operation of hydro-electric, mining, and smelting plant, desires position. Box 99, "Electrical News," 119 Board of Trade Bldg., Montreal. 23-24

FOR SALE

2 Westinghouse Motors, 2 h.p. 550 Volts, 3 phase, 25 cycle, 480 r.p.m. Motors have never been used. Price reasonable. Box 725 Electrical News, Toronto. 23

FOR SALE

Largest electrical and storage battery business in Northern Saskatchewan. Annual turn-over \$80,000.00

Apply 319, G. North,
19-24 Saskatoon, Sask.

ELECTRIFICATION OF ITALIAN RAILWAYS

Reports forwarded by U. S. Assistante Commercial Attaché Osborne, of Rome, indicate that the Director-General of the State Railways is suggesting that the Gov-

ernment have the reparations account settled in part by requiring the Germans to hand over material which could be used in electrifying Government railways. The office of the auditor-general is said to oppose this means of settlement and to consider it preferable to have the adjustment of reparations made on a strictly money basis.

The reports state that plans have been completed for the electrification of the Bologna - Verona - Brenner, Pisa - Leghorn, and Venezia Giulia lines, as well as for a shortened route between Rome and Naples. Studies are being made for the possible electrification of the Naples-Reggio, Calabria, and Paola-Cosenza lines.

In order to carry out this extensive program the Director of Railways is negotiating with the Ministry of the Treasury in order to obtain the necessary funds. The Official Gazette of October 1 published law decree Number 1298, whereby the State Railways Administration is authorized to expend the sum of 160,000,000 liras (about \$6,400,000 at present exchange) for the purchase of 120 electric locomotives.

ALGERIA GOOD PAINT AND VARNISH MARKET

Algeria is thought to be an excellent market for paints and varnishes in proportion to its population of about 6,000,000. The principal cities and ports are Algiers (the capital) and Oran, with populations of 203,000 and 146,000, respectively. The only drydock is at Algiers, where considerable marine paint is consumed. Paints and varnishes are imported principally from France, Belgium, England, and the United States in about the order named. In 1919 and 1920 these

imports were as follows: In 1919, 69 metric tons of varnishes, valued at \$93,026, and 782 metric tons of paints, worth \$443,128; in 1920, 253 metric tons of varnishes, worth \$343,540, and 1,860 metric tons of paint, with a value of \$948,788.

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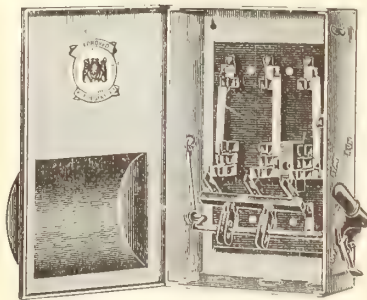
100 h.p.	3 ph.	25 cyl.	550 volts.	710 r.p.m.
75 h.p.	3 ph.	25 cyl.	550 volts.	480 r.p.m.
60 h.p.	3 ph.	25 cyl.	550 volts.	750 r.p.m.
52 h.p.	3 ph.	25 cyl.	550 volts.	720 r.p.m.
30 h.p.	3 ph.	60 cyl.	550 volts.	970 r.p.m.
30 h.p.	3 ph.	25 cyl.	550 volts.	720 r.p.m.
35 h.p.	3 ph.	25 cyl.	550 volts.	715 r.p.m.
30 h.p.	3 ph.	60 cyl.	220 volts.	1150 r.p.m.
30 h.p.	3 ph.	25 cyl.	550 volts.	750 r.p.m.
30 h.p.	3 ph.	25 cyl.	550 volts.	1500 r.p.m.
25 h.p.	3 ph.	25 cyl.	550 volts.	750 r.p.m.
25 h.p.	3 ph.	25 cyl.	550 volts.	715 r.p.m.
15 h.p.	3 ph.	25 cyl.	220 volts.	720 r.p.m.
15 h.p.	3 ph.	25 cyl.	550 volts.	750 r.p.m.
13 h.p.	3 ph.	25 cyl.	550 volts.	700 r.p.m.
7 1/2 h.p.	3 ph.	25 cyl.	220 volts.	1500 r.p.m.
7 1/2 h.p.	3 ph.	25 cyl.	550 volts.	1450 r.p.m.
7 1/2 h.p.	3 ph.	25 cyl.	550 volts.	725 r.p.m.
7 1/2 h.p.	3 ph.	25 cyl.	550 volts.	700 r.p.m.
6 1/2 h.p.	3 ph.	25 cyl.	550 volts.	1440 r.p.m.
5 h.p.	3 ph.	25 cyl.	550 volts.	750 r.p.m.
3 h.p.	3 ph.	25 cyl.	550 volts.	1500 r.p.m.
3 h.p.	3 ph.	25 cyl.	550 volts.	1425 r.p.m.
3 h.p.	3 ph.	25 cyl.	550 volts.	1400 r.p.m.
2 h.p.	3 ph.	25 cyl.	550 volts.	1500 r.p.m.
2 h.p.	3 ph.	25 cyl.	550 volts.	1440 r.p.m.
2 h.p.	3 ph.	25 cyl.	550 volts.	1400 r.p.m.
1 1/2 h.p.	1 ph.	60 cyl.	110 volts.	1750 r.p.m.
1 h.p.	3 ph.	25 cyl.	550 volts.	1500 r.p.m.
1 h.p.	3 ph.	25 cyl.	220 volts.	710 r.p.m.
1/2 h.p.	1 ph.	60 cyl.	110 volts.	1700 r.p.m.
1/2 h.p.	1 ph.	25 cyl.	110 volts.	1450 r.p.m.
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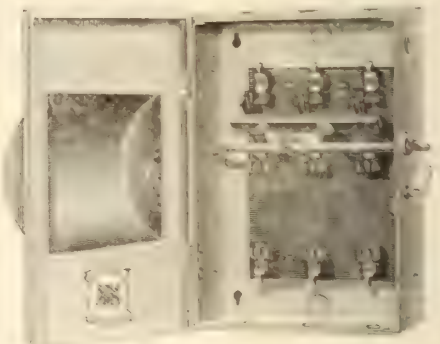
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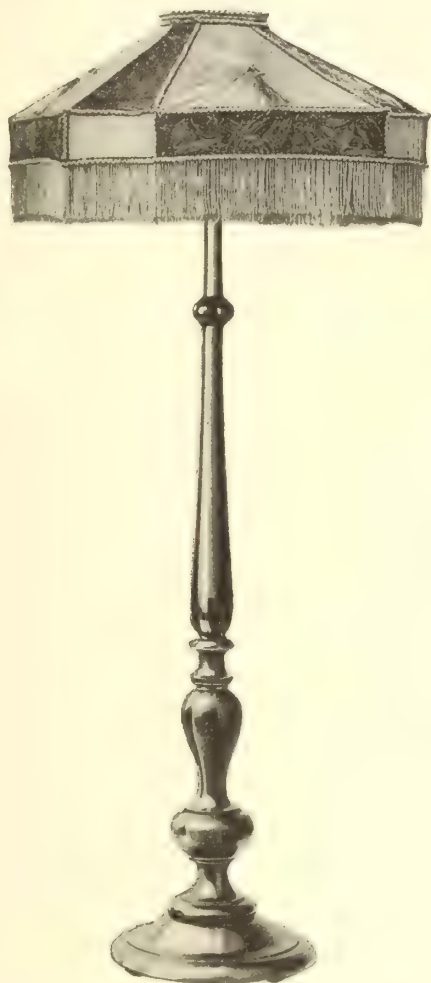


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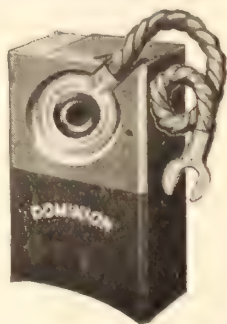
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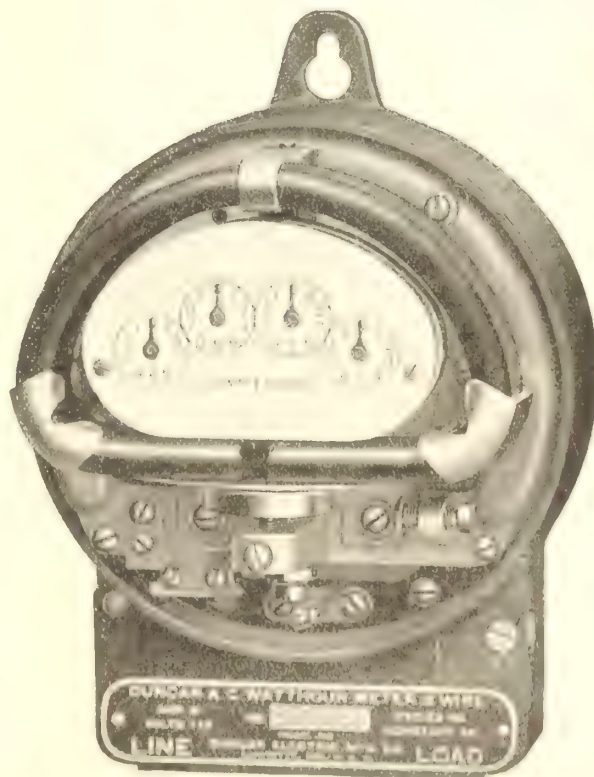
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 - 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
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 - 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1500 rev.
 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 - 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE
- 2 1 hp. St. Louis 110 volt, 60 cycle, 1800 rev.
 - 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
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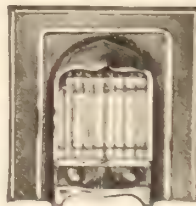
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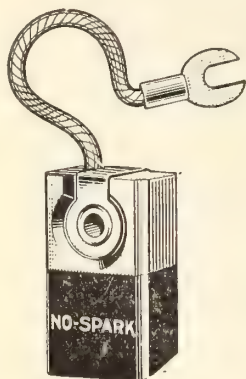
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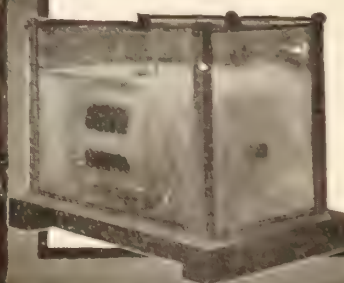
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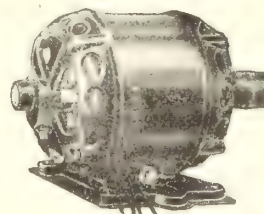
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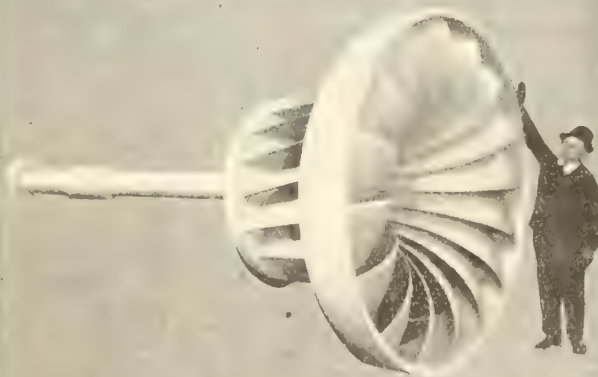
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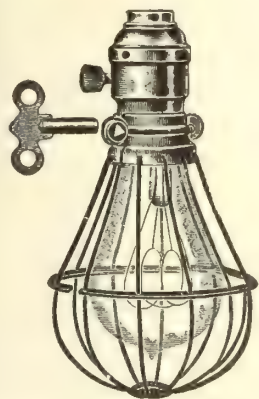
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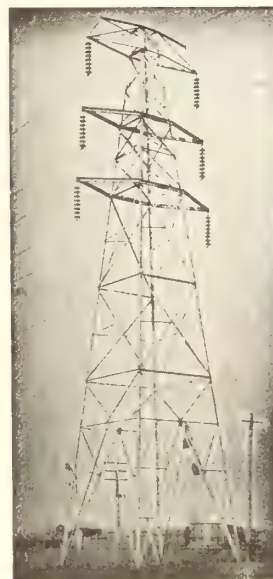
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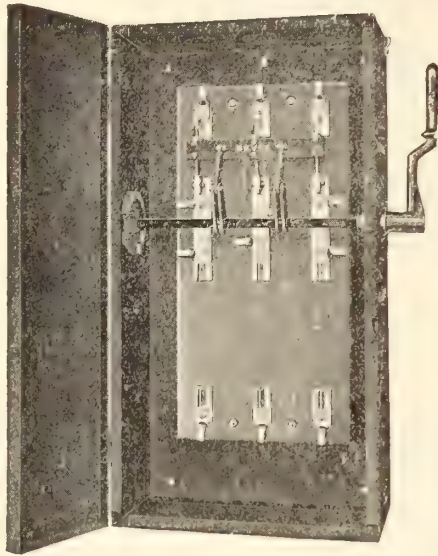


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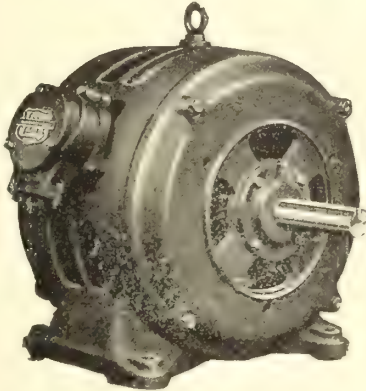
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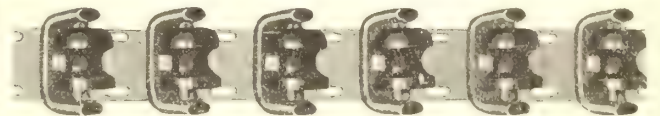
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CONDUIT BOX FITTINGS

Hatheway & Knott, Inc.
Killark Electric Manufacturing Company
Northern Electric Company

CONDULETS

International Machinery & Supply Co.

CONTROLLERS

Canadian Crocker-Wheeler Company
Canadian General Electric Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Northern Electric Company

COOKING DEVICES

Canadian General Electric Company
Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company
Spielman Agencies, Registered

CORDS

Northern Electric Company
Phillips Electric Works, Eugene F.

CROSS ARMS

Northern Electric Company

CRUDE OIL ENGINES

Boving Hydraulic & Engineering Company

CURLING IRONS

Northern Electric Co. (Chicago)

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Canadian General Electric Co., Ltd.
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
International Machinery & Supply Co.

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G. & W. Electric Specialty Company

DISCONNECTORS

G. & W. Electric Specialty Company

DISCONNECTING SWITCHES

Electrical Development & Machine Co.
Winter Joyner, A. H.

DOORS FOR BUS AND SWITCH COMPARTMENTS

Electrical Development & Machine Co.

DREDGING PUMPS

Boving Hydraulic & Engineering Company

ELECTRICAL ENGINEERS

Gest, Limited, G. M.
See Directory of Engineers

ELECTRIC HEATERS

Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Equator Mfg. Co.
McDonald & Willson, Ltd., Toronto
National Electric Heating Company

ELECTRIC SHADES

Jefferson Glass Company

ELECTRIC RANGES

Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company
Renfrew Electric Company

ELECTRIC RAILWAY EQUIPMENT

Canadian General Electric Co., Ltd.
Canadian Johns-Manville Co.
Electric Motor & Machinery Co., Ltd.
Northern Electric Company
Ohio Brass Company
T. C. White Electric Supply Co.

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Canadian General Electric Co., Ltd.
Canadian Drill & Electric Box Company
Dominion Electric Box Co.

ELECTRICAL TESTING

Electrical Testing Laboratories, Inc.

ELEVATOR CONTRACTS

Dominion Carbon Brush Co.

ENGINES

Boving Hydraulic & Engineering Co. of Canada
Canadian Allis-Chalmers Company

FANS

Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Century Electric Company
Great West Electric Company
McDonald & Willson
Northern Electric Company
Renfrew Electric Company
Robbins & Myers

FIBRE (Hard)

Canadian Johns-Manville Co.
Diamond State Fibre Co. of Canada, Ltd.

FIBRE (Vulcanized)

Diamond State Fibre Co. of Canada, Ltd.

FIRE ALARM EQUIPMENT

Hart Battery Co.
Hatheway & Knott, Inc.
Northern Electric Company
Slater N.

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Benson-Wilcox Electric Co.
Crown Electrical Mfg. Co. Ltd.
Canadian General Electric Co., Ltd.
Duquesne Electric & Mfg. Co.
Jefferson Glass Company
McDonald & Willson
Northern Electric Company
Tailman Brass & Metal Company

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Canadian National Carbon Company
McDonald & Willson, Ltd.
Northern Electric Company
Spielman Agencies, Registered

FLEXIBLE CONDUIT

Canadian Triangle Conduit Company
Hatheway & Knott, Inc.
Slater, N.

FUSES

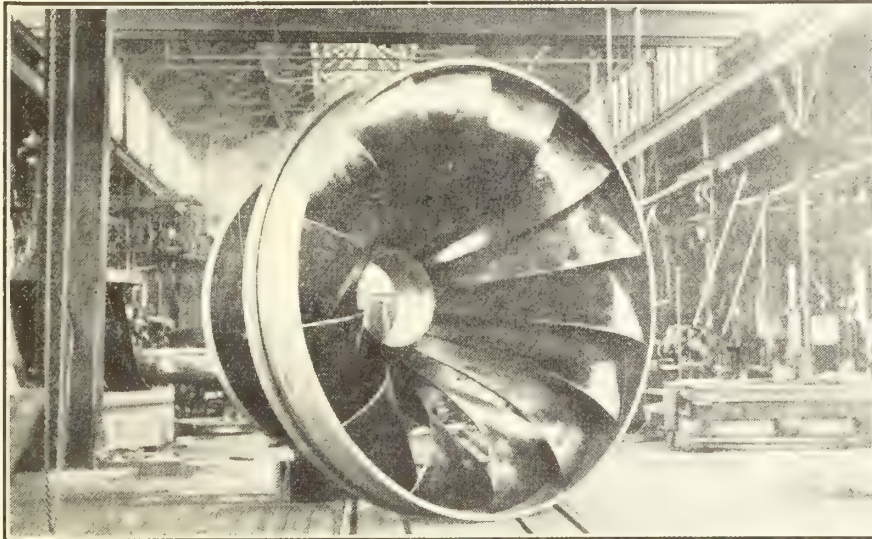
Canadian General Electric Co., Ltd.
Canadian Johns-Manville Co.
Canadian Westinghouse Company
G. & W. Electric Specialty Company
Hatheway & Knott, Inc.
International Machinery & Supply Company
Moloney Electric Company of Canada
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THIS TRADE MARK



IS YOUR GUARANTEE

Made in Canada

Water
TurbinesHydraulic
GovernorsTurbo
PumpsHigh
EfficiencySubstantial
ConstructionContinuous
Service

BOVINGTON HYDRAULIC & ENGINEERING CO., LIMITED
LINDSAY - ONTARIO

MOFFATS ELECTRIC RANGES



E 30B

Baking Oven. 18" x 18" x 13", fitted with one top and one bottom element, 1,250 watts each.

Warming Oven. 20" x 20" x 7½", fitted with one 440 watt element and "off and on" switch.

Top is fitted with one 1,700, one 1,500 and two 770 watt elements, each one controlled by our new 3-heat indicating switch.

Floor Space. 52" x 25". Height over all, 57½"

Porcelain Enamel Parts. Back Splash, End Splash from Table to top of Warming Closet, Door Panels, High Shelf and Crestings.

Maximum Capacity. 66 amperes, requires 3 No. 8 wires for 110 volts.

Shipping Weight. 315 lbs.

Built of heavy Armco Iron that resists rust

Sold by most electrical dealers

Great West Electric Co., Ltd.

87 KING ST. - - WINNIPEG.

CLASSIFIED INDEX TO ADVERTISEMENTS—CONTINUED

FROSTING

Arts Electrical Company

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Northern Electric Company

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Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Co., Ltd.
Ferranti Meter & Transformer Mfg. Co.
Lincoln Electric Company of Canada
Northern Electric Company
Thomson Company, Limited
Toronto & Hamilton Electric Company

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Consolidated Lamp & Glass Company
Jefferson Glass Company

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Electrical Development & Machine Co.

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International Machinery & Supply Co.
McGill Manufacturing Company

HANGERS (Cable)

Standard Underground Cable Company of Canada, Limited

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Hamilton Company, Wm.
Smith Company, S. Morgan

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Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Electrical Appliances, Ltd.
Hatheway & Knott, Inc.
Hubbell Electric Products Co.
National Electric Heating Company
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HYDRAULIC MACHINERY

Boving Hydraulic & Engineering Company

ILLUMINATING GLASSWARE

Jefferson Glass Company

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Canadian Inspection and Testing Laboratories

INSULATING VARNISHES AND MOULDING COMPOUNDS

Canadian Johns-Manville Company
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Canadian Westinghouse Company
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Sangamo Electric Company of Canada, Ltd.

INSTRUMENT CUTOFF SWITCHES

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Northern Electric Company

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Continental Fibre Company
Diamond State Fibre Co. of Canada, Ltd.
International Machinery & Supply Co.

INSULATION (Hard Fibre)

Diamond State Fibre Co. of Canada, Ltd.

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Canadian Westinghouse Company
Hatheway & Knott, Inc.
Illinois Electric Porcelain Company
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Mica Company of Canada
Northern Electric Company
Ohio Brass Company
T. C. White Electric Supply Co.

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Packard Electric Company

INSULATING VARNISHES

Canadian Johns-Manville Co.

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Canadian Westinghouse Company
National Electric Heating Company
Northern Electric Company

IRONING MACHINES

Canadian Ironing Machine Co.
Meyer Bros.

LAMP BULBS (Electrical)

Jefferson Glass Company

LAMP SHADES—SILK

Manufacturers Trading & Holding Co.
Standard Silk Shades, Ltd.

LAMPS

Benson-Wilcox Electric Co.
Canadian General Electric Co., Ltd.
Canadian National Carbon Company
Canadian Westinghouse Company
Electrical Maintenance & Repairs Company
Hatheway & Knott, Inc.
McDonald & Willson, Ltd., Toronto
Northern Electric Company

LANTERNS (Electric)

Canadian National Carbon Company
Duncan Electrical Company
Spielman Agencies, Registered

LIGHTNING ARRESTORS

Moloney Electric Company of Canada
Northern Electric Company

LIGHT-REGULATORS

Dominion Battery Company

LINE MATERIAL

Canadian General Electric Co., Ltd.
Canadian Johns-Manville Co.
Canadian Line Materials Ltd.
Electric Service Supplies Company
Northern Electric Company
Ohio Brass Company
Slater, N.
Steel Company of Canada, Limited
Steel City Electric Company

LIGHTING STANDARDS

Canadian General Electric Co., Ltd.
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LOCK AERIAL RINGS

Slater, N.

MAGNETS

Canadian Westinghouse Company

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MEASURING INSTRUMENTS

Northern Electric Company

METERS

Canadian General Electric Co., Ltd.
Canadian National Carbon Company
Canadian Westinghouse Company
Chamberlain & Hookham Meter Company
Ferranti Meter & Transformer Mfg. Co.
Great West Electric Company
Lincoln Electric Company
Northern Electric Company
Packard Electric Company
Sangamo Electric Company of Canada, Ltd.

MICA

Fillion, S. O.
Kent Brothers
Mica Company of Canada

MOTORS

Canadian Crocker-Wheeler Company
Canadian National Carbon Company
Canadian Westinghouse Company
Century Electric Company
Electrical Maintenance & Repairs Company
Electric Motor & Machinery Company
Ferranti Meter & Transformer Mfg. Co.
Gellinas & Pennock
Great West Electric Company
Lincoln Meter Company
MacGovern & Company
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Petrie, Limited, H. W.
Robbins & Myers
Thomson Company, Limited, Fred.
Toronto & Hamilton Electric Company
Wagner Electric Mfg. Company of Canada
Wilson-McGovern, Limited

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Calebough Self-Lubricating Carbon Co.
Dominion Carbon Brush Company

MOTOR STARTING SWITCHES

Canadian Drill & Electric Box Company

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Moloney Electric Company of Canada

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Canadian General Electric Co., Ltd.
Northern Electric Company
Ohio Brass Company

PANEL BOARDS

Benjamin Electric Manufacturing Company
Canadian General Electric Co., Ltd.
Canadian Krantz Manufacturing Company
Devore Electric Switch Company
Northern Electric Company

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McGill Manufacturing Company
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Fetherstonhaugh & Hammond
Ridout & Maybee

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Slater, N.

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Canadian Line Materials Ltd.
Hamilton Company, Wm.

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Hatheway & Knott, Inc.

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Lindsley Brothers Company
Northern Electric Company

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Northern Electric Company
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POST TYPE INSULATORS

Electrical Development & Machine Co.

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G. & W. Electric Specialty Company
Northern Electric Company
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Boving Hydraulic & Engineering Company
Canadian General Electric Co., Ltd.
Electric Motor & Machinery Co., Ltd.
Hamilton Co., Wm.
MacGovern & Company

PUMPS AND PUMPING MACHINERY

Boving & Company of Canada
Canadian Allied Machine Company
Hamilton Co., Wm.

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Canadian General Electric Co., Ltd.
Diamond State Fibre Co. of Canada, Ltd.
Monarch Electric Company
Northern Electric Company
Paulding, John I.

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Canadian Westinghouse Company

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Benjamin Electric Mfg. Co.
Pittsburgh Reflector & Illuminating Co.

REMOTE CONTROL SWITCHES

Electrical Maintenance & Repairs Company

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Toronto & Hamilton Electric Co., Ltd.

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Electrical Development & Machine Co.

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ROSETTES

Benjamin Electric Manufacturing Company
Northern Electric Company

SLATE

Davis Slate & Mfg. Company
Hydeville Slate Works.

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McDonald & Willson, Ltd., Toronto
McGill Mfg. Co.
Northern Electric Company

CANADIAN PORCELAIN CO.

LIMITED

HAMILTON - CANADA

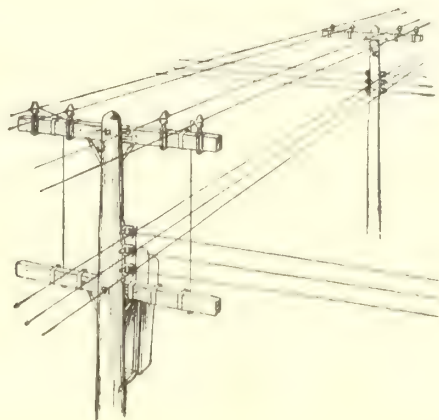
*Manufacturers of High and Low
Tension Porcelain Insulators*



Peirce Brackets

Peirce Pole Line Hardware

Patented



N. Slater Company, Ltd., Acme Stamping & Tool Works Branch Hamilton, Ont.

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Davis Slate & Manufacturing Company

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Ferranti Meter & Transformer Mfg. Co.
Monarch Electric Company

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Canadian Johns-Manville Company
Packard Electric Company
Northern Electric Company

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Canadian General Electric Co., Ltd.
Century Telephone Construction Company
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Canadian General Electric Co., Ltd.
Canadian Westinghouse Company
Equator Manufacturing Company
Hubbell Electric Products Co.
National Electric Heating Company
Northern Electric Company
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Northern Electric Company

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TRANSMISSION TOWERS

Canadian Bridge Company

TROLLEY GUARDS

Ohio Brass Company

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MacGovern & Company
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Northern Electric Company
Standard Underground Cable Co. of Canada, Ltd.

VACUUM CLEANERS

Canadian General Electric Company
Franke Levasseur & Co.
Hoover Suction Sweeper Co. of Canada, Ltd.
McDonald & Willson, Ltd., Toronto
Northern Electric Company

VARNISHES

Spielman Agencies, Registered

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Canadian General Electric Co., Ltd.
Coffield Washer Co. of Canada, Ltd.
Henderson Business Machines, Ltd.
Hurley Machine Company
McDonald & Willson
Meyer Bros.
Northern Electric Company
Slade Mfg. Co.

WATER WHEELS

Hamilton Co., Wm.
Smith Company, S. Morgan

WELDING EQUIPMENT

Lincoln Electric Company of Canada

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Boston Insulated Wire & Cable Company, Ltd.
International Machinery & Supply Co.
McDonald & Willson, Ltd., Toronto
Northern Electric Company
Phillips Electrical Works, Ltd., Eugene F.
Standard Underground Cable Company of Canada, Limited

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Hatheway & Knott, Inc.
Northern Electric Company

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Robertson Mfg. Company, P. L.

WRINGERS (Power)

MacBride Corporation, Limited
Meyer Bros

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Quality Goods--Honest Values--Prompt Service

Send your Orders for

Electrical Supplies and Appliances Lighting Fixtures and Glassware

to

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Head Office and Showrooms

347 YONGE STREET

TORONTO

Catalogues free on request

BENSON-WILCOX ELECTRIC CO.

LONDON - - CANADA

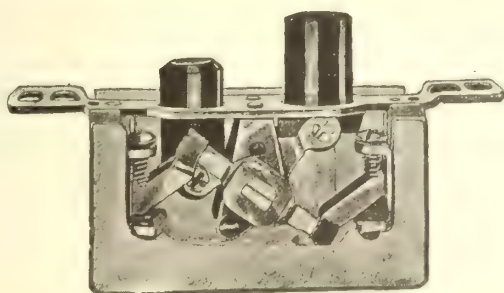
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Try Us for Service

**ELECTRICAL SUPPLIES
FIXTURES-MACHINERY**

MOST COMPLETE Stock IN CANADA

The New England Push Switch



**Have You Seen Its Sales
Possibilities Yet?**

If not give us the opportunity of telling you all about the splendid opportunities for real live trade this device offers. No obligation entailed.

JOHN I. PAULDING, Inc.
NEW BEDFORD, MASS.

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SLATE

ELECTRICAL SLATE & MARBLE

DAVIS
SLATE

SLATE

Our "Fair List" No. 7
Gives Prices and Shipping Weights
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Exclusive Canadian and Largest American
Electrical Slate and Marble Producers

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Five Factories

DAVIS
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DAVIS
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CIRCUIT BREAKERS

BETTER AND CHEAPER THAN FUSES
THE CUTTER CO. PHILADELPHIA

Double the Life of Your Pole Lines

By using our

OPEN TANK TREATED

British Columbia Cedar Poles

They afford your pole lines better support, and add considerably to their appearance. Let us send you further particulars and prices. No obligation.

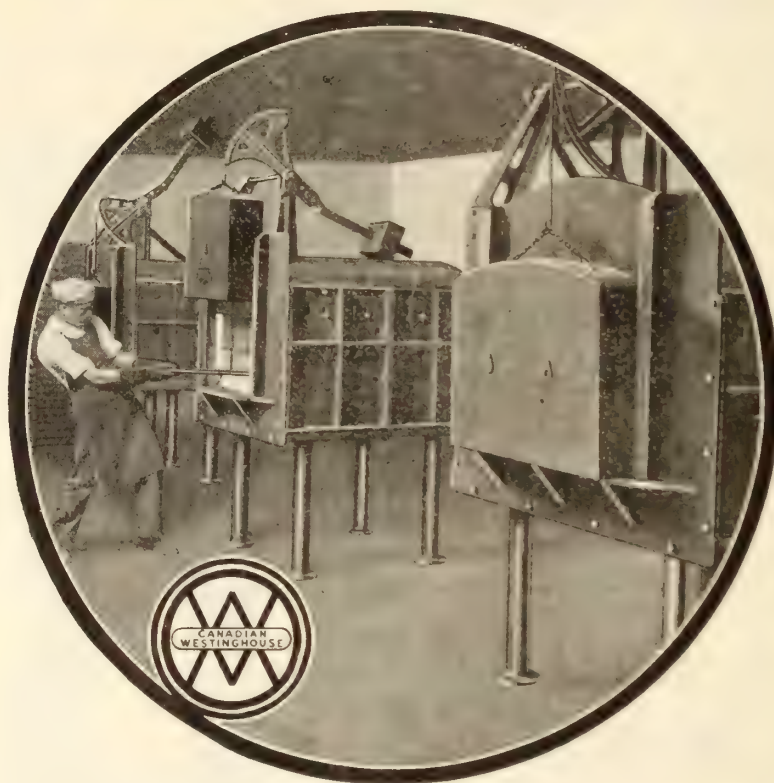
Lindsley Brothers Canadian Co., Ltd., Nelson, B. C.

Filer-Smith Machinery Company, Limited,
708 Confederation Life Building, Winnipeg, Man.

Irving Smith, 602 New Birks Building, Montreal.

Westinghouse

Hevi-Duty Industrial Furnaces



These furnaces are built in 12 standard sizes for heavy-duty industrial work of every description within the capacity of furnace temperatures up to 2000° F.

Special sizes of any capacity and form are built to meet special conditions according to specifications.

Characteristics

Heat is generated and distributed uniformly from the top, bottom and sides of the furnace chamber, thereby heating the work six to ten times faster than where the heating is done from the sides of the furnace chamber only. In special cases heating elements are placed in the door, and at the back of the furnace, thus heating from all six surfaces of the furnace chamber.

No internal connections are used in Hevi-Duty furnaces. All terminal connections are air cooled. The terminal loss is as low as 2-2/10%. The thermal efficiency of Hevi-Duty Furnaces runs as high as 90%.

Applications

Annealing Furnaces for carbon steel, high-speed steel, alloy steel, copper, zinc, aluminum and glass.

Hardening Furnaces for carbon steel and alloy steel.

Drawing Furnaces for carbon steel, alloy steel and high-speed steel.

Vitreous Enameling Furnaces for sanitary ware, chemical tanks, kitchen utensils, stove parts, hardware and chemical processes.

Industrial Plants; for use in tool rooms, machine shops, forge shops, etc.

Shipbuilding Plants in the manufacture of machines and apparatus going into the ships.

Canadian Westinghouse Co., Limited, Hamilton, Ont.

TORONTO, Bank of Hamilton Bldg.
HALIFAX, 105 Hollis St.
CALGARY, Canada Life Bldg.

MONTREAL, 285 Beaver Hall Hill.
FT. WILLIAM, Cuthbertson Block.
VANCOUVER, Bank of Ottawa Bldg.

OTTAWA, Ahearn & Soper, Ltd.
WINNIPEG, 158 Portage Ave. E.
EDMONTON, 211 McLeod Bldg.

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MONTREAL—113 Dagenais St.
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VANCOUVER
1090 Mainland St.

WINNIPEG—158 Portage Ave. E.
CALGARY—316 Third Ave. E.

A Lost Opportunity

As a wiring contractor, how many times have you turned down orders to repair the Motors or dynamos of your customers and let them send their work to the maker?

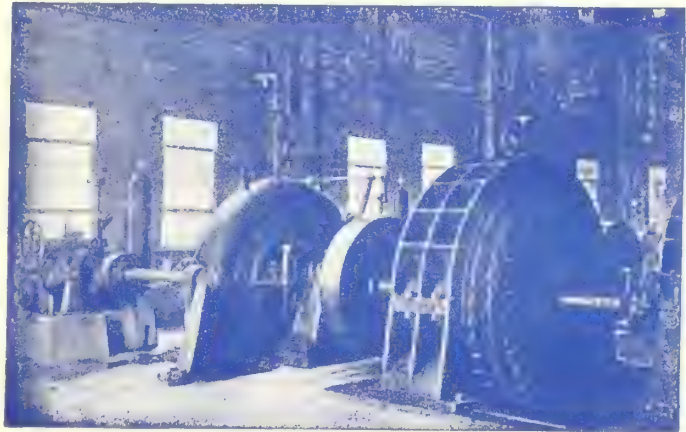
How much have YOU lost in prestige through not being able to take care of your customers' business?

How much have YOU lost in Profit on this business?

Get the habit of handling these repairs. Send them to a Specialist in Repairs. Don't send them to the maker. Your customer can do that, and he's already sick of it. The service is too slow. He wants quick work and an absolutely reliable job. You can give it to him.

Make up your mind now. Say "I'm going to get something out of the next repair job in this town."

You have the work of taking out and re-installing the machine (Profit). Send us the machine or part with a description of its action or symptom. We'll rush it through for you, give you an A1 job and you come in again on the Trade Discount (More Profit).



Others are doing it. Why not you? Write about it.

The Electrical Maintenance & Repairs Company, Limited

Phones:
Adelaide 902
Adelaide 903

162 Adelaide Street West, Toronto
"ALWAYS ON THE JOB"

Nights and Holidays
R. B. Rothwell, Supt., Beach 1930
G. T. Dale, Manager, Beach 1723

Nine Reasons for Using the Socket Head Screw

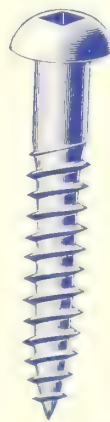
FIRST—It is driven with about half the exertion required in driving the ordinary slot-headed screw, all the power used is concentrated in turning the screw.

SECOND—It does not require to be started with a hammer, and may be started and driven with one hand.

THIRD—It is impossible for the driver to slip out of the socket and cut the finger or disfigure costly furniture or woodwork.

FOURTH—The screw cannot wobble, as it is held fast in a line with the driver, and consequently goes in true and straight.

FIFTH—The screw lasts longer, as there is no wear on the head, this part will last as long as the body of the screw, which is practically indestructible.



Pat'd Feb. 2, 1909

SIXTH—Practically adapted for long screw driver and difficult work, and can be driven in overhead work as readily as on the bench.

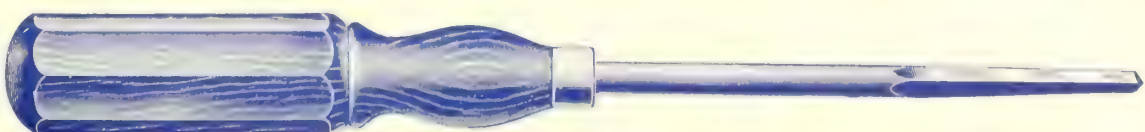
SEVENTH—For overhead work—electric wiring, or work in difficult places, it practically cuts the work in two, and eliminates all danger of the driver slipping and coming in contact with live wires.

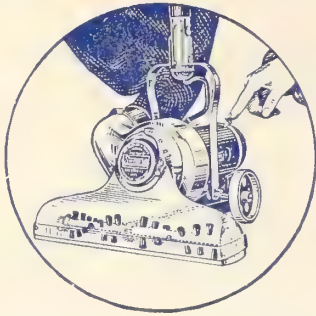
EIGHTH—It can be driven at any angle, because the screw fits the driver and becomes, as it were, one solid piece with the driver.

NINTH—It removes entirely the possibility of ragged looking heads, which are not only unsightly, but cut the hands and destroy the clothing.

The P. L. Robertson Mfg. Co., Ltd., Milton, Ont.

One of the
drivers
supplied
--FREE--





Observe "that lever." It gives you two machines in one

This two-in-one cleaner sells itself in competition. Design, workmanship and the scientific principle of cleaning appeal to your prospective customers. Write us for information regarding this wonderful machine which increases your sales and profits.

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Kribs Canadian Maid and
Miss Simplicity Washing Machines, National Electric Appliances and Sweepers, etc., Vacuum Cleaners.

Sold on Easy Payments

FORWARD

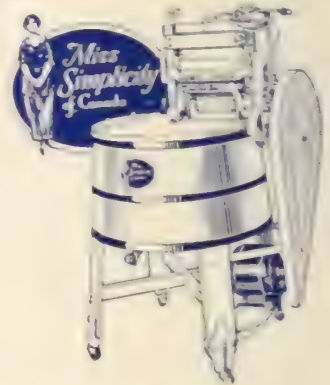
The Electric Sweeper Vac.

is Two Cleaners in One

FIRST—Because it cleans by powerful suction plus a correctly speeded brush.

SECOND—Because it cleans by powerful suction alone.

**EARLE
LIMITED
ELECTRIC**



66-72 Nelson St.

TORONTO, ONT.



Can You Isolate 90%?

Practically 90% of street lighting outages are due to troubles occurring above ground.

With the G & W Disconnecting Series Pothead each post is an independent unit above the sidewalk level.

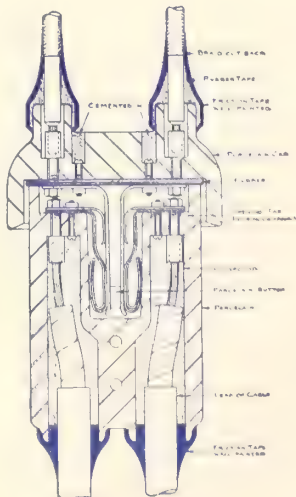
The underground cables are sealed at the bottom of the post and the post leads are connected to the detachable cap of the pothead. The entire post may be removed without disturbance to any permanent electrical connection. In case of accidental post wrecks there need be no high voltage above ground.

For testing; each post can be "rung out," also each section from post to post.

In repairs or replacement the patrolman is protected by a fully visible absolute physical disconnection.

Lead cables must be sealed. A cutout is essential to the best service.

The combination of cable seal and cutout into one small device is available under G & W patents, at the price of one device.



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Electrical

News

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Transformers
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every purpose



In use in
all parts of the
world.

A 5,000 K.V.A. Three-phase, 60-Cycle, 55,000-Volt, Oil-immersed, Self-cooled Transformer, Outdoor type, with oil-conservator vessel

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Putting the "Spark of Life"
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Buildings.

Adanac
the Wire Supreme

UNIFORM Quality and Dependability are the two vitally important factors to be found in Adanac Insulated Wire.

The fact that the greater number of our Hospitals, Banks, Theatres, Hotels and Office Buildings are now wired with Adanac is proof of its popularity and established reputation.

*You make no mistake when you use
or specify ADANAC*

Northern Electric Company
LIMITED

MONTREAL
HALIFAX

QUEBEC
OTTAWA

TORONTO
HAMILTON

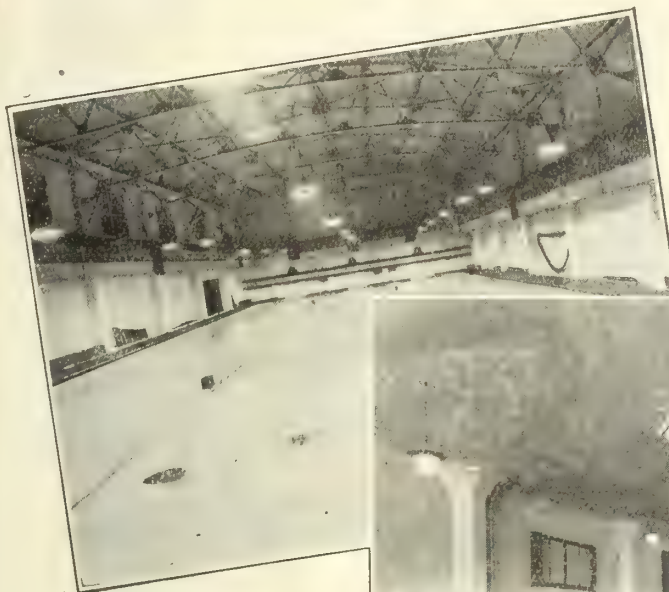
LONDON

WINDSOR
WINNIPEG

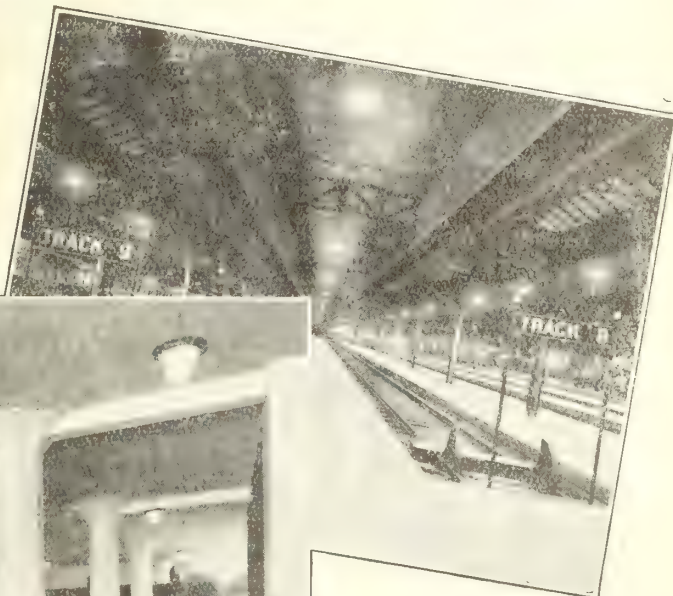
REGINA
CALGARY

EDMONTON
VANCOUVER

For Better Illumination



Lighting Installation
in St. Andrew's
Curling Rink
Montreal



Lighting Installation
in Windsor Station
Montreal



Brascolites in Cleghorn & Beattie's Furniture Store, Ottawa, Ont.

These Installations solved three problems of Correct Lighting

Your territory teems with unsolved lighting problems. Many factories, offices, stores, hotels, churches, theatres and other public buildings are victims of defective illumination. New buildings are constantly being erected. Every lighting prospect has its own peculiarities, to meet which a variety of fixtures are designed. It becomes a question of correct application. Let our illumination specialists assist you in deciding the form of lighting best adapted to your clients' needs.

Write our nearest house

Northern Electric Company

LIMITED

Montreal	Quebec	Toronto	London	Regina	Edmonton
Halifax	Ottawa	Hamilton	Windsor	Winnipeg	Vancouver

M O L O N E Y

The CANADIAN TRANSFORMER with a REPUTATION



Single Phase
POWER TRANSFORMER

WE claim for our product, absolute dependability under all conditions. Past performance has substantiated our claims and proved superiority of design and workmanship.

The installation of a Moloney Transformer means positive and efficient service. The name "Moloney" stands for entire satisfaction.



3 Phase
POWER TRANSFORMER

A
Canadian
Made
Transformer



Write for
Bulletins
185 190
195 210

MOLONEY ELECTRIC COMPANY OF CANADA, LIMITED

Agents:

Frank Darling & Co., Ltd., Vancouver. General Supplies Ltd., Calgary. Frank H. Girdlestone, 188 Fort Street, Winnipeg

District Offices

Factory

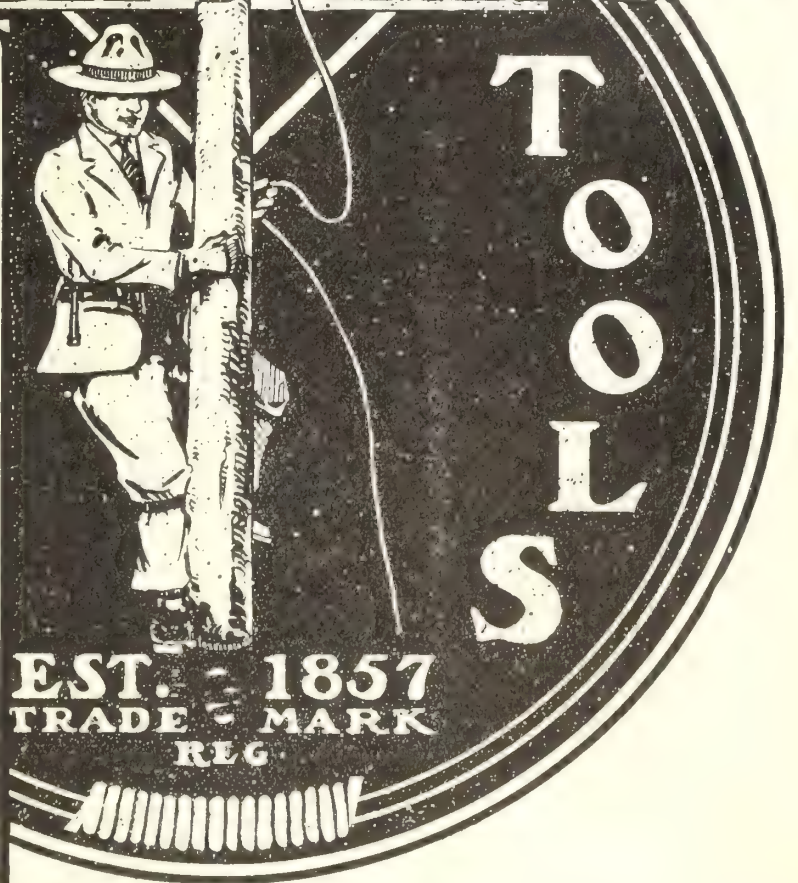
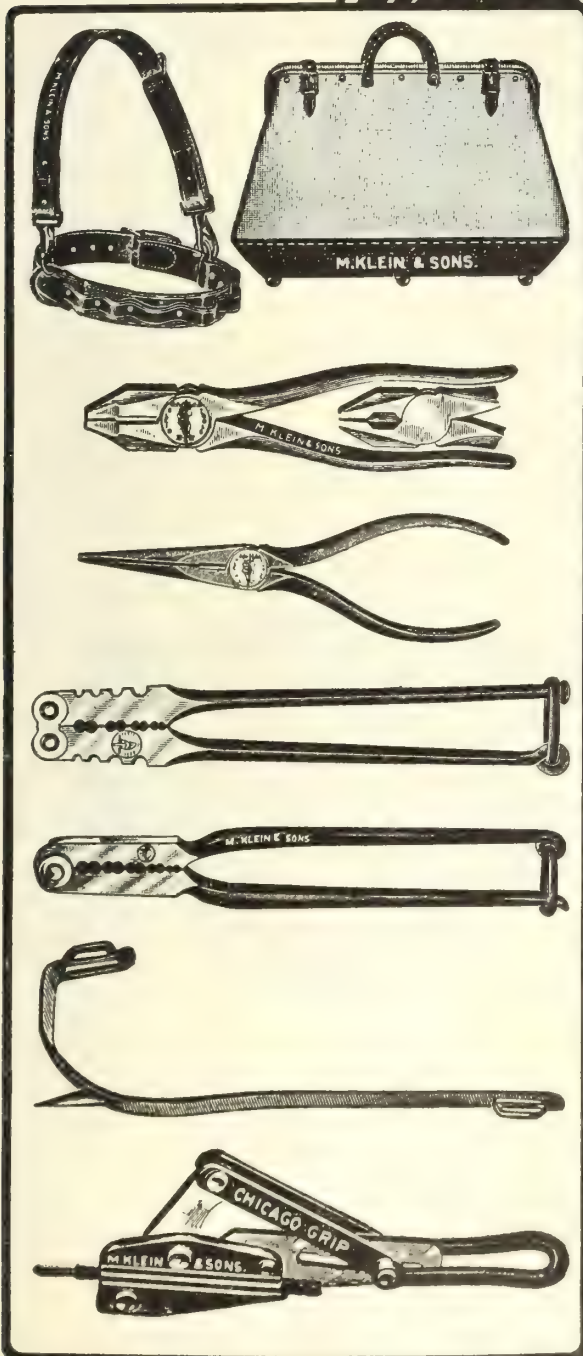
Head Sales Office

Montreal and Halifax

Windsor, Ont.

1221-4 Bank of Hamilton Bldg., Toronto

EVERY LINEMAN A KLEIN MAN

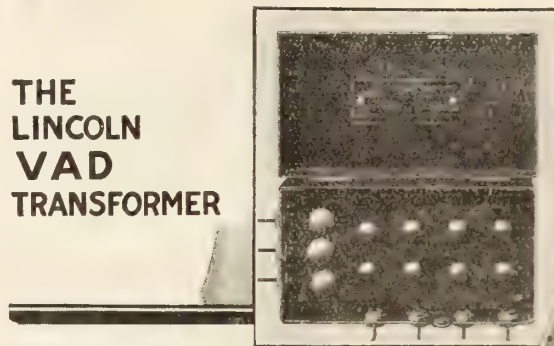


Ever notice the number of linemen that are Klein men! Ever wonder why they've been picking Klein tools out as the "best buy," for sixty-four years?

What gluttons Klein tools are for the punishment your "gangs" give them.

Mathias KLEIN & Sons
 Established 1857 Chicago, Ill. U.S.A.

THE
LINCOLN
VAD
TRANSFORMER



THE BOOK ON
VOLT-AMPERE
MEASUREMENT



Send for this Booklet on Recognizing Your Customers' Power Factors

EVERY customer on your lines is today more interested in the dollars he spends than ever before. Because of the fact, you have an unusual opportunity to gain his good will to a greater degree than ever before.

The booklet illustrated above covers two subjects, first, the accurate measuring of each customer's maximum demand as well as his actual consumption,—how you can bill entirely on a measured basis, how you can eliminate all personal element in figuring a customers bill.

Second, it describes briefly and clearly how the Lincoln V A D Transformer enables you to measure this demand to a volt-ampere base (also explained) and how you thereby consider each customer's power factor, and encourage the proper use of all the current you furnish.

There are many other interesting discussions on your costs and your customers' costs all presented in a clear manner.

Look into this subject recently given so much attention by electrical authorities in both the Dominion and in the United States. Read why magazines have printed page after page about it. To ask for your copy today places you under no obligation whatever.

The Lincoln Meter Co., Limited

243 College Street, Toronto, Canada

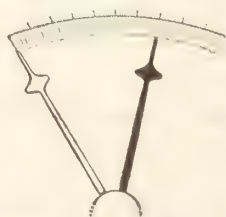
Cable "Meters" Toronto Phone College 1374



Hand now on
left varies with
load and
shows this
load at any
time of day

Hand now on
right moves
only to right
and indicates
maximum load
since last re-
setting

Lincoln
MAXIMUM DEMAND
meter

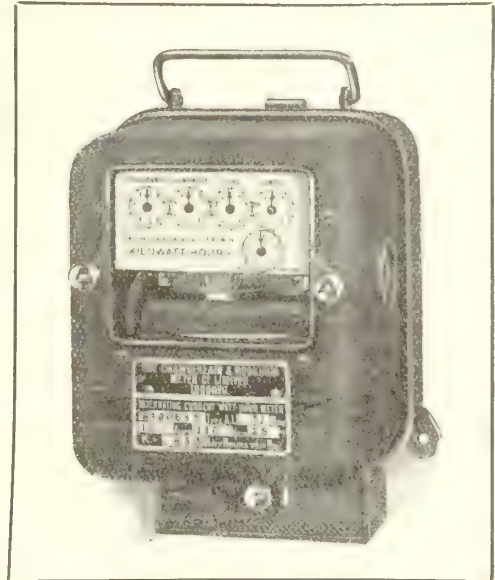


Government Re-Testing

302 C & H Meters were due for re-inspection in an Ontario town.

They were sent into the test room on Monday, the following Friday 302 Meters left the test room re-sealed, no parts or repairs being required to accomplish this end.

How's this for quality and reliability? Send us your orders.



Chamberlain & Hookham Meter Co., Limited

243 COLLEGE STREET, TORONTO

Branches all over the World

USED ELECTRIC MOTORS

IN STOCK NOV. 5th

ALTERNATING CURRENT

550 Volts 3 Phase 60 Cycle				220 Volts 3 Phase 60 Cycles							
H.P.	1800	R.P.M.		H.P.	1200	R.M.P.		H.P.	1800	R.M.P.	
1	"	"	Westinghouse	20	"	"	Ckr.-Wheeler	5	"	"	Fairbanks
3	"	"	Thomson	20	"	"	Allis Chalmers	7½	"	"	A.C.B.
5	"	"	A.C.B.	20	"	"	G.E.	10	"	"	S.G.E.
5	"	"	Westinghouse	20	"	"	C.G.E.	10	"	"	A.C.B.
5	"	"	Ckr.-Wheeler	25	"	"	Burke	25	"	"	T. and H.
7½	"	"	Thomson	25	"	"	C.G.E.	60	"	"	Ckr.-Wheeler
7½	"	"	A.C.B.	30	"	"	Westinghouse	75	"	"	Westinghouse
7½	"	"	G.E.	30	"	"	G.E.	75	"	"	Westinghouse
7½	"	"	Westinghouse	30	"	"	Fairbanks	100	"	"	Fairbanks
7½	"	"	Westinghouse	35	"	"	G.E.	2200 Volts 3 Phase 60 Cycles			
10	"	"	C.G.E.	35	"	"	Westinghouse	50	"	"	A.C.B.
10	"	"	C.G.E.	35	"	"	Westinghouse	200	"	"	Ckr.-Wheeler
10	"	"	Westinghouse	40	"	"	C.G.E.				
10	"	"	Ckr.-Wheeler	40	"	"	Westinghouse				
15	"	"	Thomson	50	"	"	C.G.E.				
15	"	"	Westinghouse	75	"	"	A.C.B.				
15	"	"	Ckr.-Wheeler	300	"	"	Westinghouse				
15	"	"	Allis Chalmers								

1—75 kw. 2300 volt 3 phase 60 cycles 900 rpm C.G.E. revolving field type generator
1—250 kw. 250 volt 3 phase 60 cycles 600 rpm C.G.E. revolving field type generator

All the above thoroughly overhauled, in first class condition and guaranteed.

NEW MOTORS

We build our standard type D
We can made prompt deliveries

THOMSON MOTOR

in all sizes up to 25 H. P.
Write for our Price List.

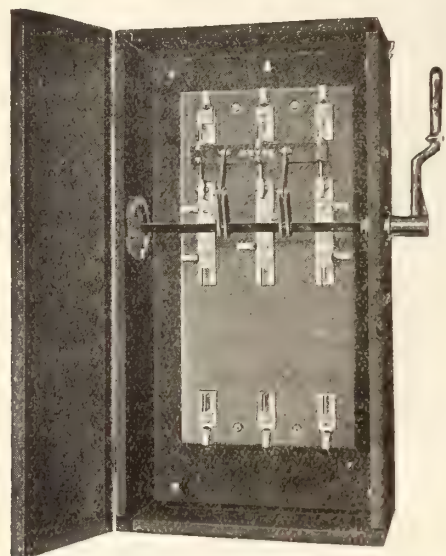
FRED THOMSON CO., LIMITED

ELECTRICAL ENGINEERS

7-13 ST. GENEVIEVE STREET

MONTREAL

DEVOE EXTERNALLY OPERATED COMPENSATOR SAFETY SWITCHES



This switch can be arranged to connect to any compensators. You will note that there are twelve lugs. In connecting for a C.G.E. Compensator remove three of the lugs shown between hinge and fuse base. If the switch is required to be connected to any other make of compensator such as Westinghouse, etc., simply remove the three straps and use the 12 lugs as shown on cut. The box can be supplied with nine porcelain bushings or slotted at bottom to fit over compensator.

THE DEVOE ELECTRIC SWITCH COMPANY

414 Notre Dame West, Montreal, and 105 Victoria St., Toronto, Ont.

Can We Help You ?

There may be certain articles which you cannot find in these advertising pages that you would like to have information on. Do not hesitate to use this form, no matter what it is. If we can be of any service to you in supplying that information, it will be a pleasure to do so. We want you to feel that the Electrical News is published in your interests, and we want to help you whenever we can.

INFORMATION WANTED

Electrical News,
347 Adelaide St. West,
TORONTO.

Date.....19

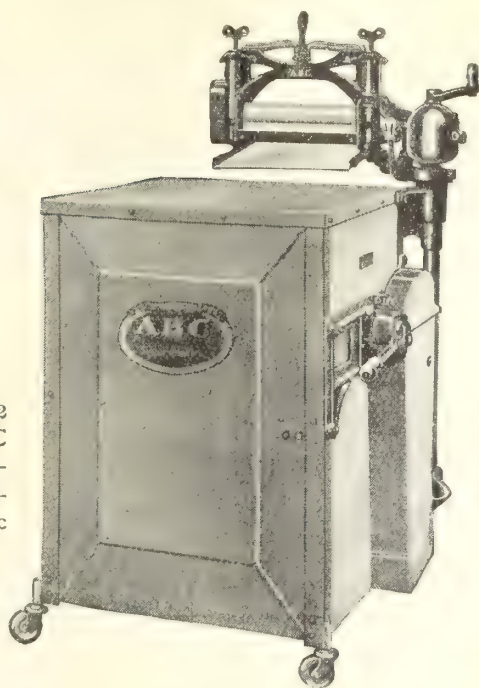
Please tell me

.....

Name

Address

The new 1922 model A B C Electric Laundress—"the Packard of Electric Washers."



You see a handsome cabinet; you hear no noise; you feel no vibration.

Valuable A B C Agencies to be Soon Allotted

An A B C Exclusive Agency is more than a mere name. It is a valuable asset to any progressive store. For it carries with it the right to the exclusive sale, in the locality allotted of the famously high-grade, complete A B C line of power and electric washers and electric ironers.

We intend to allot a limited number more of these valuable franchises in the very near future to dealers who wish to link up their business with a line that attracts the best patronage.

Applications should be made at once

The A B C Line covers the whole field of price demand with models that are of highest quality. Starting with the A B C "Alco" dolly-type washers, single and twin tub, power or electric, the line includes galvanized and copper tub, maple or zinc cylinder models in semi-cabinet A B C Super Electric Washers,

as well as the full cabinet model above shown. Also there are the A B C Electric Ironers, supplied either with independent motors or with attachments to enable any A B C electric washer to operate them.

In all, there are ten different models. Continent-wide distribution and quick service back up the dealer who is so fortunate as to secure one of these A B C exclusive agencies.

Sincere co-operation in advertising and selling is also given by distributors and by the factory.

The proposition is well worth entertaining, without delay, if you desire to build for the future as well as for the present on a line of washers and ironers that will mean satisfied customers and excellent profits.

Write at once for full particulars concerning these valuable A B C agencies that are soon to be added.

A B C *Electric Laundress*
WASHES **WRINGS** **IRONS**

C. D. Henderson

Box No. 123,

Canadian Representative

Brantford, Ont.

WHOLESALE DISTRIBUTORS:

MARITIME PROVINCES
 Blackadar & Stevens,
 Roy Building,

Hallifax - - - N.S.

ONTARIO
 Masco Co., Ltd.,

78 Richmond St. - Toronto

ALBERTA
 Cunningham Electric Co., Ltd.,
 Calgary

QUEBEC
 Dawson & Co., Ltd.,

148 McGill St. - Montreal

SASKATCHEWAN
 Sun Electrical Supply, Ltd.,
 Regina

BRITISH COLUMBIA
 Rankin & Cherrell,
 Vancouver

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				White Electrical Co., T. C.	68
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Ideas

Study the ideas and methods in your trade paper. Find out how the other fellow does it and apply the principle—it may need some changes, but if it worked for him it can be made to work for you.

Keep a close watch on the advertisements. The manufacturers and jobbers are using their space to give you information on the goods you need. The latest styles, market conditions, prices, etc., are big factors in the success of your business.

Galvaduct



A Galvaduct Building

The Jackson Building, Ottawa

George C. Graves Construction Co., Builder

Albert Ewart, Architect; Canadian Comstock Co., Electrical Contractor

"GALVADUCT"

The most perfect interior construction conduit on the market.

Recognized as the standard of high quality.

"LORICATED"

A high-class interior construction conduit of the enameled type, proof against acid or other corrosive agents.

Loricated

Always specify GALVADUCT or LORICATED CONDUITS

If your jobber cannot supply you—write us

CONDUITS COMPANY LIMITED

TORONTO

MONTREAL

Western Sales Office: 602 Avenue Building, Winnipeg

WHY “TRICABLE”

TO MAKE A BEND—TO TURN A CORNER

No. 8-3 Conductor “TRICABLE” Bends on a Radius of 2 in.

“TRICABLE” WILL SAVE 40%

On Your Next

ELECTRIC RANGE INSTALLATION

*All Standard Sizes stocked for immediate
delivery. If your jobber cannot supply
WRITE DIRECT*

Selling Agents—

CONDUITS COMPANY, LTD.

33 Labatt Ave. - - Toronto.



Wallace

ADJUSTABLE Lamp

THE ASSORTMENTS WITH THE NUMEROUS FINISHES has increased the trade four-fold.

No.1 Assortment contains—6 Brass, 2 Nickel. 2 Bronze
Costs \$43.20 2 Green,

No. 2 “ contains—6 Brass, 4 Nickel. 4 Green,
Costs \$90.00 2 Gray, 2 Ivory, 2 Brown,
2 Bronze, 2 Black.

BUY AN ASSORTMENT—MAKE A DISPLAY AND
RAKE IN THE DOLLARS.

As useful in the store, office
factory, shop, library, club,
as in the home and
on the road.

JOINT HERE
FOR ADJUSTING
POSITION OF
LAMP.

FOLDED WHEN
NOT IN USE
FOR TRAVELLING.

SPRING CONCEALED IN BASE WILL FASTEN
TO BACK OF CHAIR OR BED.

In Eight Beautiful Finishes

Brass
Nickel
Gray Enamel
Green Enamel
Brown Enamel
Bronze
Ivory Enamel
Black Enamel

Every WALLACE
LAMP has eight feet
of extension cord.

GOOD
DISPLAY
MATERIAL
SUPPLIED

You probably have a supply on hand but even so—

RE-ORDER AN ASSORTMENT FOR THE
LAST WEEK BEFORE CHRISTMAS. : :

MENZIES AND COMPANY, LIMITED

439 King St., W.

Toronto.

Write
For
Our
Sales
Manual

How
To Sell
Thro'
Canvassers

Simplex Electric Heating Pad No 685



The Simplex pad was the first Electric Heating Pad put on the market and for over a quarter of a century has been the standard by which all other pads have been judged.

SPECIFICATIONS

Type No. 685.
Voltages 100-125, 200-250.
Watts 50.
Three Heats.
Size 12 x 15 in.
Shipping Weight 3 lbs.

Retail

Price

\$15.00

Discounts on Application

—NOTICE TO THE TRADE—
**SIMPLEX ELECTRIC HEATING PAD
DISPLAY STANDS**

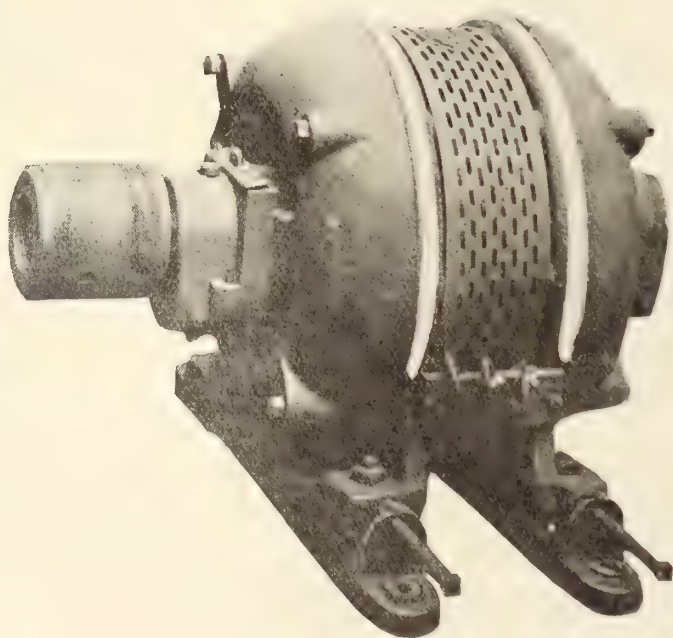
Sent Upon Request With Every Initial Order For Six or More Pads.

"OTHER SIMPLEX PRODUCTS"

Toasters, Flat Irons, Stoves, Ranges, Soldering Irons, Heater Cords, etc.

Gelinas & Pennock Reg'd MONTREAL, Canada
207 St. James St.,

Eastern Representatives: SIMPLEX ELECTRIC HEATING COMPANY



None Better Made

That may seem a big claim, but performance proves it. And the performance "Gold Band" Motors give is due to their splendid design and the high grade materials and careful workmanship entering into their construction.

Try them once and you will use them always.

Write for list of used motors carried in stock

Special Offer in Used Motors:

5-2½ H.P. Kimble Motors 110V.
60-35 Cy. Variable Speed 550 to
2200 R. P. M., Style A. D. J.

Marchand Electrical Works Limited

U. A. Leduc

J. E. Lamothe

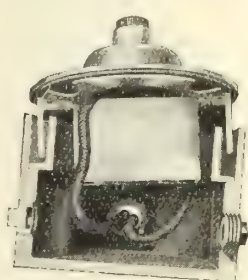
55 COTE ST.

Phone Pl. 665-843

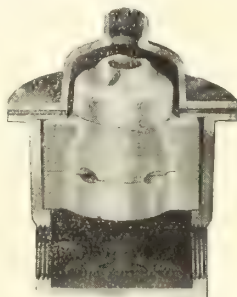
MONTREAL

MR. CONTRACTOR - DEALER—

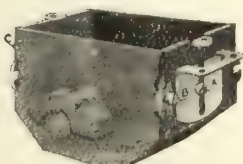
are you PREACHING the gospel of "More Convenience Outlets" to the Architects and Owners? The chandelier must be cast into the discard as a medium for supplying current to electrical devices. More Floor Outlets, Receptacles and Switch Boxes must be installed if current consuming devices are to be used daily as a necessity instead of as an occasional luxury.



Fullman Adjustable
Floor Outlet



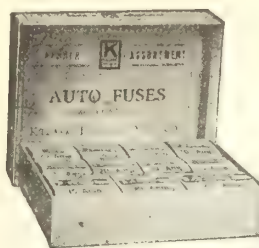
Fullman Non-Adjustable
Floor Outlet



Improved "Steel City"
Switch Box

Write for sample of our new
Improved Switch Boxes
to show to your customers.

STEEL CITY ELECTRIC CO.
PITTSBURGH, PA.



Here's Your Entire Auto Fuse Department

Carrying a stock of fuses makes it important that you have one which, while complete, necessitates only a small investment.

The Killark No. 700 Banner Auto Fuse Assortment

"The Complete Auto Fuse Department in One Unit"

gives you a complete stock of 100 fuses, assorted in eleven sizes and packed in an attractive display carton which takes up less than a square foot of room on your counter—and requires but a small investment.

Killark Auto Fuses can also be had in bulk. Your jobber has both in stock. If not, send us his name with your order.

KILLARK ELECTRIC MFG. COMPANY
ST. LOUIS, MO.

Canadian Sales Agents

HATHEWAY & KNOTT

Electrical Merchandise

117 West Street, NEW YORK

New York Headquarters for the Canadian Electrical Trade

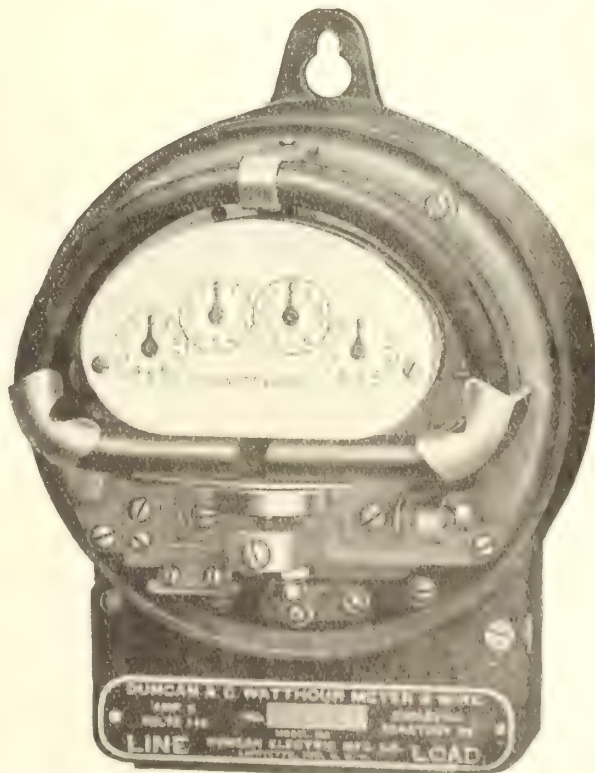
DUNCAN MODEL M2

FOR ALTERNATING CURRENT SERVICE

SUPERIORITY

of construction has always been looked upon by Duncan engineers as one of the prime requisites in meter development, and this ideal is characteristically manifested in the Model M2. Its every detail towards perfection has been worked out to a degree of precision hitherto unobserved.

No other meter in use today shows the degree of accuracy on overloads as does the Duncan Model M2. Test this out for yourself. Its magnet is so satisfactory and dependable that it is looked upon as opening up a new era of design for permanency.



THE GEORGE C. ROUGH SALES CORP'N.

131 CORISTINE BLD'G
MONTREAL

ANNOUNCING—

The New Highly Efficient Glass for Lighting



Sol-lux Glass is a new discovery of the Jefferson Factory and will meet and surpass any lighting tests or comparisons with the highest qualities of white glassware.

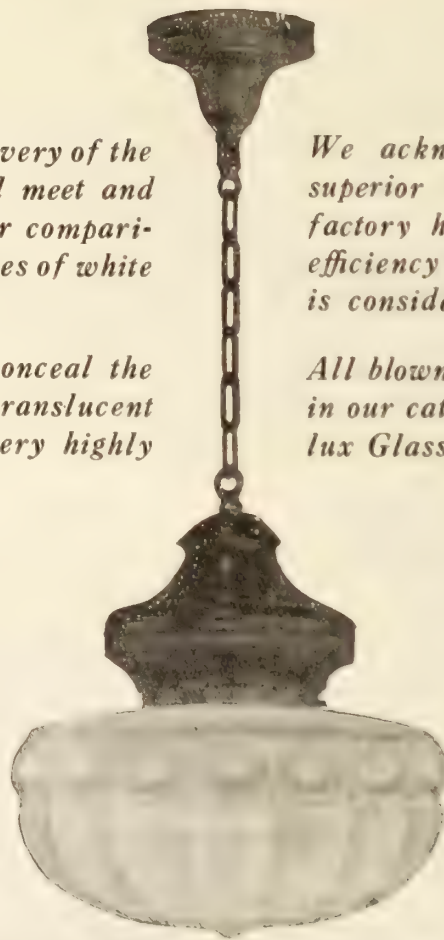
It is just dense enough to conceal the source of light and yet translucent enough to be classed as very highly efficient.

We acknowledge Sol-lux to be far superior to any production of our factory heretofore and feel that the efficiency and completeness of our line is considerably bettered.

All blown lighting pieces illustrated in our catalogues may be had in Sol-lux Glass by specifying same.

WRITE FOR
PRICES

SAMPLES NOW
READY

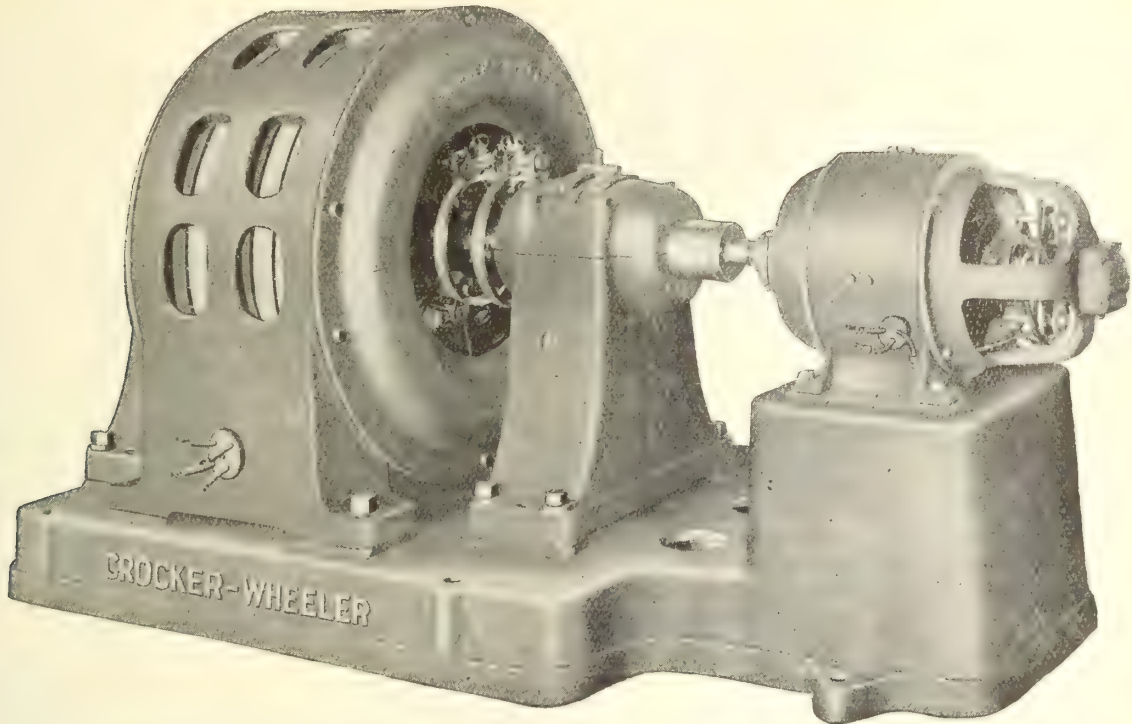


FACTORY & HEAD OFFICE
388 CARLAW AVE
TORONTO

DOWN-TOWN SHOWROOMS
164 BAY ST. TORONTO

Jefferson
MADE IN CANADA
Glass
COMPANY LIMITED

285 BEAVER HALL HILL
MONTREAL
272 MAIN STREET
WINNIPEG
510 HASTINGS ST. W
VANCOUVER



300 K.V.A. 900 R.P.M., 4000 volts, 3 phase, 60 cycles, Synchronous Condenser with Direct Connected Exciter supplied to Hydro Electric System, Hanover, Ontario.

Penalties for Power Factor

come under the same pleasant head as epidemics and taxes—they eat profits—and there is going to be more and more enforcement of this clause in the power contracts by the central stations. You can cut them out, however, absolutely, via the Synchronous Condenser route, and Canadian Crocker-Wheeler ample production facilities are here ready to give you prompt relief.

Canadian Crocker-Wheeler apparatus and service are available at all the N. E. Co. branches as follows:

Montreal, Halifax, Ottawa, Toronto, London, Winnipeg, Regina, Calgary, Vancouver.

Northern Electric Company
LIMITED

THE CANADIAN CROCKER-WHEELER CO. LIMITED

Manufacturers and Electrical Engineers

Head Office and Works:
ST. CATHARINES, Ont.

District Offices:
TORONTO MONTREAL

50 % — on Cost

Is it too Much or not Enough?

—Many electrical men are so concerned over getting the price down that the mere mention of 50% or 60% is to their minds ridiculous.

Figure it out

—No one will dispute the fact that it costs 25% (of sales) to do business or in other words, out of every dollar taken in 25 cents must be paid out for expenses, so that by adding 50% to the cost the net profit is less than 10%.

It's not Enough

—Then why court financial disaster by doing work or selling goods at 25 or 30% on cost when you know that this does not even cover your expenses, let alone profit?

Use the Henderson Business Service

—It keeps you posted on prices—guarantees a profit on each article leaving your shop and introduces system into your office.

70 cents a week

Pays for this Service

It will pay for itself 20 times over

Write for Order Blank

HENDERSON BUSINESS SERVICE

Limited

Box 123

Brantford

-

Ontario

Used from Halifax to Vancouver

You'll find O-B *MODERNIZED INSULATORS* for every station use

Besides electrical stress, station insulators often must take care of considerable mechanical strain—and within strict space limits.

In planning station layouts, so many engineers have chosen O-B *MODERNIZED INSULATORS* that a wide variety of designs for this class of service is available. Or, if your requirements are unique, you, too, will discover that there are elaborate facilities at the O-B Factory for making special shapes.

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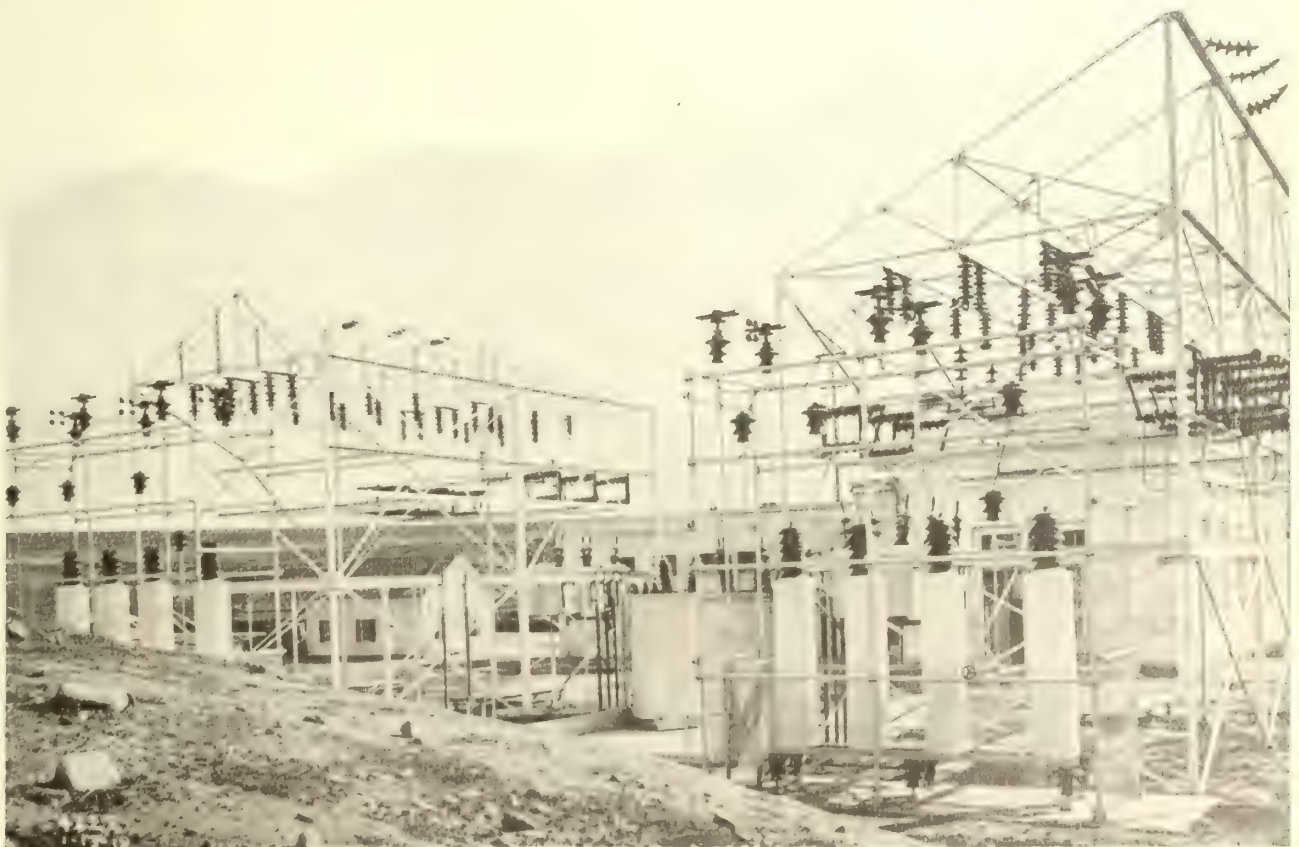
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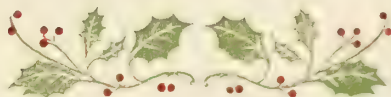
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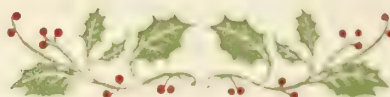
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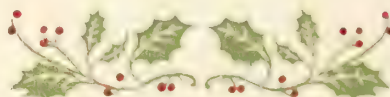
To The Electrical Dealers and Contractors Of Canada



THE Directors, Officers and Staff of the Canadian General Electric Co., Limited, take this opportunity of wishing you the Compliments of the Season.



We trust your Christmas Campaign will exceed your fondest dreams, and that the results will inspire you to redouble your efforts towards making 1922 the Banner Year for the Electrical Industry of Canada.



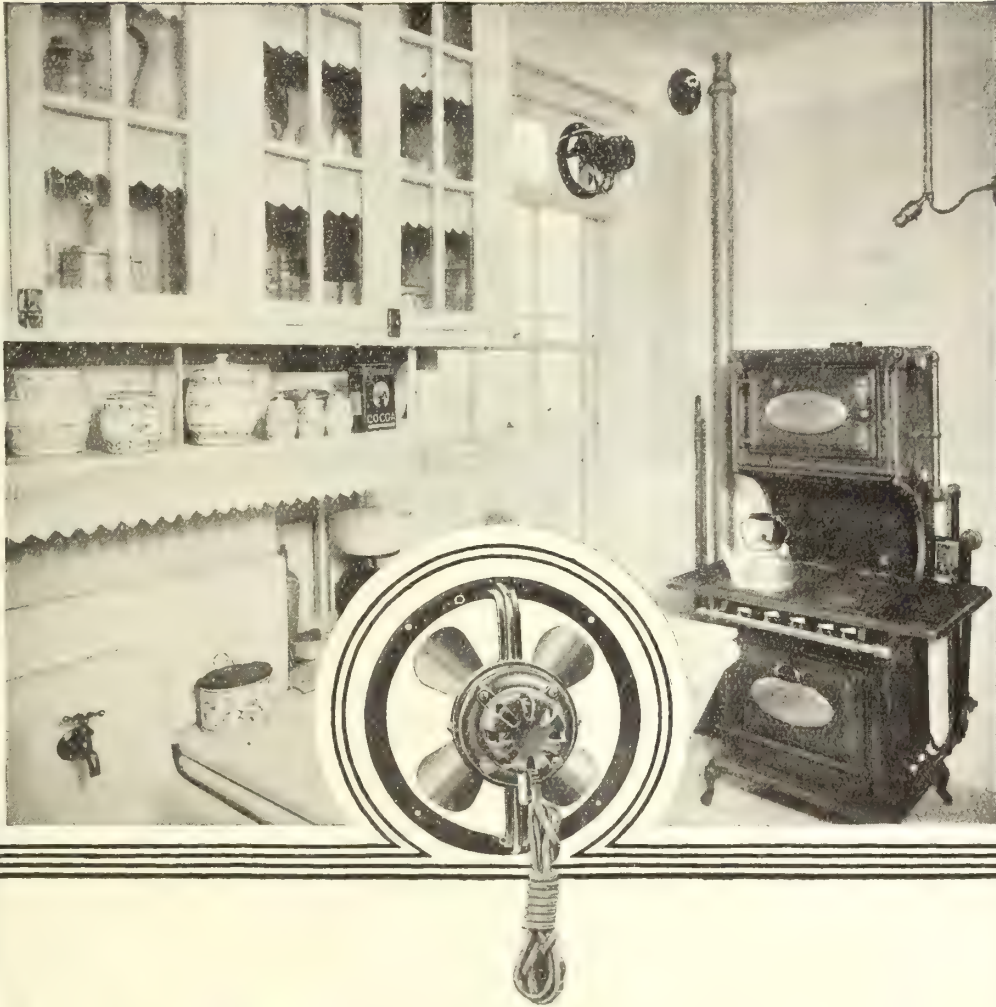
On behalf of our District Branch Managers, located from Coast to Coast, we wish to extend a cordial invitation to make use of the facilities at your disposal. If we can be of any assistance, whatsoever, towards making your Christmas Campaign one hundred percent successful, please command us.

Say "Merry Christmas" Electrically

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This fan is suitable for kitchens in apartments and houses, toilets, laboratory hoods, drying equipments, and small rooms which do not require the larger ventilating fans. The fan runs very quietly, and as the blades have a steep pitch it moves a good volume of air.

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Vol. 31 Toronto, December 15, 1921 No. 24

Twin City Guaranteed Fair Return On Property Valuation

It will be of interest to Canadian electric railwaymen, as
well as to many investors in Canada, where the stock of
both companies is widely held, to know that the Twin City
Rapid Transit Company and the Duluth-Superior Traction
Company have taken advantage of the recent State legislation
which provides that any street railway co'y may surrender its
municipal franchise and accept in its place an indeterminate
permit under certain terms of the Act. These terms invest
the State Railroad and Warehouse Commission with power
and authority to value the property of the street railways
and fix a rate of fare that will yield a reasonable return on
the fair value of the property as an operating system. These
two companies have, therefore, made formal application to this
Commission for the valuation of their properties and the es-
tablishment of a rate of fare based on that valuation.

In common with other electric railway systems, both in
Canada and the United States, the two companies above men-
tioned have suffered severely from the greatly increased cost
of operating, which has prevented the payment of dividends
during the past few years. It is hoped that the present ar-
rangement, which appears to be not unlike what is more
generally known as "Service at Cost," will enable these
companies to maintain and operate their properties efficiently
and leave enough to pay a fair return on investment. Much,
of course, will depend upon the valuation of the property, as
determined by the Commission, but it has frequently been
said that the Twin City Rapid Transit Company is the best

maintained system on the continent and the Duluth-Superior,
being controlled by closely related interests naturally oper-
ates on a similar policy.

Of all the foolish courses that have been urged upon our
people by political demagogues, there has been nothing quite
so unreasonable as that of trying to force a street railway
company to operate under an antiquated franchise agreement
that starves the company and at the same time starves the
service handed out to the public. All over the continent to-
day our electric railway systems are run down at heel, so to
speak, to such an extent that the service is open to criticism
and their operation is often attended with grave danger to
the public. The outstanding exceptions are the systems op-
erating on a service-at-cost basis; Montreal is a fair example.
Under that system the people can get practically anything
they ask for, the only condition being that they pay for it.
No attempt to get electric railway service at less than cost
can ever result satisfactorily.

Another Bathroom Fatality to "Credit" Of the Electrical Industry

The report of another bathroom fatality comes from
Winnipeg. We are indebted to Mr. F. A. Cambridge, city
electrician of that place, for the following details:

"A member of a firm of undertakers, living in a rented
house, consulted the Inspection Dept. as to a new house he
was building, with special reference to a form of electric
heater he should use in a bathroom. The Department ad-
vised him to install a stationary heater with grounded frame
owing to the risks attendant on the use of heaters in these
locations.

"The party ridiculed the idea of danger, but the follow-
ing day a victim of a bathroom fatality was lying in his par-
lours awaiting a Coroner's inquest.

"About two months afterward, the servant maid in this
rented house, while taking a bath, had both her hands se-
verely burned through grasping a portion of a heater cord
while standing in the water. The secondaries were thor-
oughly grounded; the voltage to ground was approximately
115 volts; the cord was regular heater cord with asbestos
insulation, but the cord had dropped into the water, and,
while the heater was disconnected, the other end of the cord
had been spliced on to an ordinary drop cord and was at-
tached to a wall bracket on the opposite side of the room.

"Needless to say, after this second experience, our un-
dertaker friend was thoroughly convinced of the hazards in-
volved in handling portable heaters and cords in bathrooms.

"The moral should be to give wider publicity to the dan-
gers attendant on the above practices and to consider whether
a different form of insulation, for portable heating devices,
should not be called for, that would give greater protec-
tion to persons against shock."

Will Build Hydro-Radials Without Government Aid

A number of municipalities in the Niagara Peninsula
have decided to have a hydro radial of their own. This, we
believe, was the plan suggested by the present Ontario gov-
ernment when the report of the Hydro-radial Commission
was unfavorable to the construction of hydro-radials under
government guarantee. Premier Drury at that time stated
that although he did not feel justified in committing the
province to a guarantee of radial bonds he could see no ob-
jection to the municipalities immediately interested under-
taking the guarantee of bonds for the construction or pur-

I have always thought
of **CHRISTMAS**
as a good time; a kind,
forgiving, generous,
pleasant time; a time when
men and women seem by
one consent to open their
hearts freely and so **I** say
God Bless Christmas.
DICKENS

—Best Christmas
wishes
from the
staff of
"ELECTRICAL NEWS"

chase of radials through their own territory, if they cared to do so.

At a meeting held at St. Catharines on December 1, at which representatives of the Niagara district municipalities were present, it was decided to submit by-laws at the forthcoming municipal elections, to take over the Niagara, St. Catharines & Toronto Railway System, which operates in that district. This line is now part of the Canadian National Railways System but it is said that the Dominion Government is ready to relinquish it to the municipalities, the figure mentioned being slightly over three and a half million dollars. The Hydro-electric Power Commission of Ontario had been asked to make a report and it was on the strength of this report that the following resolution was unanimously carried:

That this meeting of municipal representatives in the Niagara district, after hearing the report of the Hydro-electric Power Commission regarding the acquisition of the Niagara, St. Catharines & Toronto Railway, desires to endorse the report and recommend to the Councils of various municipalities that by-laws be submitted at the forthcoming municipal elections to take over said railway on behalf of the municipalities.

The property to be acquired includes lines connecting Niagara-on-the-Lake, Port Dalhousie, St. Catharines, Merriton, Thorold, Niagara Falls, Welland, Humberstone and Port Colborne as well as the local systems in St. Catharines, Merriton, Thorold and Niagara Falls.

Certain extensions, also, are included in the plan, to cost about \$350,000., one of these in Thorold and another in St. Catharines. Rehabilitation of the whole system is estimated to require a further expenditure of \$775,000.

Covering Country with Radio Service

Following the great success and wide-spread interest that has been the outcome of pioneering in radio telephone broadcasting by the Westinghouse company, this company has announced an extension to the service that will allow anyone, anywhere in the country, to enjoy the many benefits of radio. The operation of the first radio broadcasting station of its kind at East Pittsburgh, Pennsylvania, for the past twelve months, has opened possibilities hitherto undreamed of. From this station alone, persons in Canada, New England, Florida, Arizona, the Dakotas, and at greater distances, have been able to enjoy the service.

In order to cover certain parts of the country not reached by this station, and to intensively service other parts, the Westinghouse company has laid out a complete program and has already added three large stations. At Springfield, Mass., station WBZ supplies New England; at Newark, N. J., station WJZ takes care of the Middle Atlantic and Southern States; and at Chicago, Ill., station KYW services the Middle and Western States.

The fact that the pioneer work of this company has not been in vain is shown by the fact that although operating a full year, station KDKA at East Pittsburgh continues to interest more people as time progresses. This is due, probably, not merely to the novelty of radio telephone broadcasting, but also to the well-planned and diversified program that has been established. At Springfield, Mass., in addition to many other features, there will be a periodical talk to farmers about market and stock conditions. A feature of the Newark, N. J. broadcasting station has been bedtime stories for the children, marine information and talks on radio. The complete transmission of grand opera from the Chicago Opera Company productions has been a feature of the recently established station on the Commonwealth-Edison

Building in Chicago. It is predicted that as a result of the diversified entertainment and information which have been broadcasted through these stations during the past year this service will prove of expanding value and distinctive interest. In all probability radio will be as popular in the home as the phonograph is to-day—and much more common. The programs as conducted by the Westinghouse company usually last for an hour each evening, and they are announced far enough in advance to enable everyone interested to know what is contemplated.

Northern Manitoba Dependent upon the Development of Water Powers

That future development of the natural mineral and pulp-wood resources of Northern Manitoba is entirely dependent upon the development of hydro-electric energy, was clearly shown in an address before the Manitoba Electrical Association at their luncheon on Thursday, November 24th, by Prof. R. C. Wallace of the University of Manitoba. For several years past, Dr. Wallace has been Commissioner in charge of Northern Manitoba, and is regarded as being an authority on all matters pertaining to this portion of the province.

Dealing with the pulp resources, Dr. Wallace said that the first development of pulp must come through the use of power developed on the Winnipeg River. The pulp resources adjacent to the Winnipeg River were as good as could be found anywhere else in the province. Labor conditions were better, transportation easier, and the new plant of the Manitoba Power Company would facilitate the development.

The speaker briefly referred to the development of the fur industry, touching upon the potential value of this industry to the province, and said that the real development of the North West was bound up in three activities—mineral, pulp and electrical development.

There was, he continued, a very important copper industry in North West Manitoba, an industry in connection with which one mine alone, the Flin Flon, had a possible 35 years' development, producing 2,000 tons of ore per day. This mine would require a block of about 25,000 h.p. These figures did not take into consideration the enormous amount of power that would be required for smelting purposes. The development of the other mines in close proximity to the Flin Flon would require another 25,000 h.p. He predicted that as soon as the European market opened up, arrangements would be made to develop the Flin Flon property.

Dr. Wallace then spoke of the possibilities of the development of the pulp industry, and said that the first development must be in the neighborhood of Selkirk or the mouth of the Winnipeg River. He stated that there was a project under foot to develop power on the Nelson River at White Mud Falls, that would supply power to the Flin Flon property and be used in the development of the pulp industry in the North. Transmission of power under this project would cover a distance of 175 miles, and the matter was now being given consideration. If this power development should come about, it would serve the whole mining region, and be a stimulus to the development of the gold territory. The speaker paid a tribute to the business aggressiveness of the Mining Corporation of Canada which was interested in the Flin Flon property, and said that once work was started on the property, further development of the adjoining area would follow.

Cross-continent Telegraph Service

Nov. 22 marked the opening of cross-continent commercial telegraph service on lines owned entirely by the Canadian Government. The new service is an epoch in the dev-

elopment of the Government telegraph system as well as in government-owned utilities. Speaking of the event, Mr. G. H. Daniels, manager at Vancouver for the Great Northwestern Telegraph Company, now a government line, said:

"Two commercial wires to eastern Canada are now open and while this is a big step, it is but one step towards unification of all government-owned telegraph services in Canada. Prior to the completion of the lines just cut in for regular service, the Government owned no commercial telegraph lines connecting B. C. with Eastern Canada. Neither was there a direct connection with the system in South-eastern B. C. nor the Yukon Telegraphs, both of which have been government-owned and operated services for many years. At the time the Canadian Northern Railway was purchased by the Dominion Government, the controlling interest in the Great Northwestern Telegraph Company was also acquired, as it was owned by the Mackenzie and Mann interests. Only railway telegraph lines had been constructed by the Canadian Northern, across Canada, and now the government has completed the lines which have been opened.

"Both in eastern and in western Canada the Government owns a number of telegraph lines covering more or less extensive areas. The addition of the G. N. W. system considerably increased the government holdings in eastern Canada, and assisted to co-ordinate them to some extent. In British Columbia the G. N. W. lines did not reach many points, the chief being Victoria, Vancouver and New Westminster. In South-eastern B. C., however, more than 200 points are served by the government commercial telegraph lines which were controlled and superintended from Kamloops. The Yukon Telegraphs, which reach across the Cariboo and Northern B. C. to the Yukon, ended at Ashcroft. In addition to those two systems, the government, on acquiring the Grand Trunk Pacific took over that company's commercial telegraph lines extending eastward from Prince Rupert.

"As the main line of the Canadian National Railway into Vancouver touches both Ashcroft and Kamloops, near Jasper Park, the new commercial lines now in commission along the Canadian National, link up all the government telegraphs in British Columbia, and also connect them direct with eastern Canada."

Voltage Reverses at Low Temperatures

The Bureau of Standards, Department of Commerce, Washington, publishes tests recently made by two of its engineers on the performance of dry and storage batteries at very low temperatures. According to the report, voltage remains constant down to 80 degrees below zero centigrade, while at 100 degrees below zero the voltage died away entirely. At a slightly lower temperature a minus reading was registered as high as 10 volts, but the readings fluctuated very violently from about 10 positive to 10 negative.

The suggestion has been made that it might be possible to re-charge batteries by reducing their temperature. The Bureau of Standards points out, however, that the amperage at these low temperatures is infinitesimally small.

Eighth Annual British Industries Fair

The eighth annual British Industries Fair which embraces a large number of the most important lines of British trade, will be held in London and Birmingham from 27th February to the 10th of March. This is purely a trade fair where buyer and seller meet, not an exhibition. This Fair, whether regarded from the point of view of size, diversity of products shown or resultant business, now surpasses in importance and value to the world's markets any other trade fair or similar purpose. A visit to the Fair will convince over-

seas buyers that enormous strides have been made in Britain's post war production. A considerable number of Canadian buyers are making arrangements to attend. Admission is restricted to trade buyers on invitation of the British Government and business is not impeded by crowds of sightseers.

The British Trade Commissioners in Canada will be pleased to give full particulars and to issue invitation cards to Canadian buyers who propose to visit the Fair, at their following addresses:—248 St. James Street, Montreal; 260 Confederation Life Building, Toronto; 610 Electric Railway Chambers, Winnipeg.

Measures Kv. a. Directly

Toronto, Nov. 25th, 1921

Editor, Electrical News:

I read with considerable interest the article by Mr. H. W. Meyer, entitled "Power Factor, an influence in rate making" in your issue of November 15th, 1921. This article finishes with a statement that as yet there is no instrument which will measure, directly, the kilovolt amperes in a circuit. We would like to point out that the Lincoln Meter Company have, during the last six months, developed a small transformer which, if attached to the Lincoln demand meter causes this meter to read kilovolt amperes between certain limits of power-factor. Two sets of taps are provided on this transformer, one covering from 65 per cent to 90 per cent power-factor and the other from 43 per cent to 75 per cent power-factor, within 2 per cent accuracy.

It will therefore be apparent to you that the development which Mr. Meyer speaks of has already arrived.

The Lincoln Meter Company, Limited
S. L. B. Lines, Vice-president

Border Cities' Electrical Show

The Border Cities' second annual Pure Food and Electric show held recently in Windsor, attracted considerable attention from the whole province and particularly in Western Ontario. Many of the best-known manufacturing firms were represented by splendid exhibits of electrical goods, and all report a week crammed full of business.

The Windsor and Walkerville Hydro commission contracted for one entire section and sub-divided it so that in all, nine firms displayed their goods including electric ranges. Electrical appliances of every kind were exhibited by the Hydro and the Northern Electric Company, while the Hoover people had a fine separate display of their sweepers.

Electrical pianos were demonstrated by the Heintzman Company and by Grinnell Brothers while electrically operated phonographs were exhibited by the Columbia Gramola Company and the above. Washing machines, too, occupied considerable floor space. Notable among these were the Trojan, Thor, Easy Washer, 1900 Washer, Sunnysuds, etc.

Local electric firms featured extensive displays of fixtures. The Chas. A. Branston Company and the Canadian Renulife Company were present with practical demonstrations and both report a splendid week.

The show is yearly growing in popularity with the manufacturers and before the end of the week, the exhibitors in the electrical section had already contracted for their space for next year's show which will be held during the week of October 16-21, inclusive.

The Sangamo Electric Company are distributing Bulletin No. 58, which describes, with illustrations, their Locomotive Type Amperhour Meter.

World-wide Power Development

All Parts of the World Involved in an Unprecedented Investigation of the Value of Water Power Resources—Uses of Hydro-Electric Energy Rapidly Increasing.

By Prof. A. H. GIBSON, D. Sc., before the British Association.

The extent to which the water powers of the world have been investigated and developed during the past decade forms one of the striking engineering features of the period. Although falling or flowing water formed the earliest of the natural sources of energy to be utilized for industrial purposes, it is of interest to note that two-thirds of the water power at present in use has been developed within the last ten years.

The reasons for the revival of interest in this question are partly technical and partly economic.

The technical development of electric generation and transmission has made it economically possible to utilize powers remote from any industrial centre, while a rapid increase in the demand for energy for general industrial purposes and for the many electro-chemical, electro-physical, and electro-metalurgical processes which are now in general use, and whose field is rapidly growing, has provided a ready outlet for all such energy as could be cheaply developed.

The urgent demand for energy to supply the abnormal requirements of the war period, combined with the world shortage of fuel, was responsible for an unprecedented rate of development in most countries with available water power resources, and especially in those countries normally dependent on imported fuel.

Thus in France some 850,000 water horsepower has been put into commission since 1915, and the country now has 1,600,000 horsepower under control as compared with 750,000 before the war. In Switzerland some 600,000 horsepower has been developed since 1914, or is in course of construction, as compared with 880,000 horsepower before the war. In Spain, where the pre-war output was 150,000 horsepower, the present output is 620,000 horsepower and about 260,000 horsepower is now in course of development, while the Spanish Ministerio de Fomento is considering the development of some 2,000,000 horsepower to be delivered into a network of transmission lines covering the industrial parts of the country.

In Italy, schemes totalling about 300,000 horsepower are under way, and it is estimated that the total output will shortly amount to 2,000,000 horsepower. The Government Hydrographical Department is now engaged in gauging and surveying the profiles of the principal rivers, and statistics of available reservoir sites, of lakes suitable for storage and of available horsepower are being compiled.

Japan, which only very recently began to investigate her water powers, has, since 1916, developed over 1,000,000 horsepower, or almost 20 per cent. of her available resources.

In Canada and the United States many large schemes have recently been brought into service, and some extremely large installations are now in course of construction or are projected. Thus the Queenston-Chippawa project on the Canadian side of the Niagara River is intended to develop some 500,000 horsepower, while a projected development of the St. Lawrence River will be capable of yielding 1,700,000 horsepower. In Canada the total development (2.3 million horsepower) in 1918 was almost three times as great as in 1910. In the United States of America the development has increased from some

thing under two million horsepower in 1901, to 5.3 millions in 1908, and to nearly 10.0 millions in 1920.

Rapid as has been the development of water power in the United States in the past, it has been retarded by the fact that the privilege of using the national forests or other public lands for waterpower development has only been granted by the issuing of permits which were not available for any definite period and which were revocable at the will of the granting authority, whether on public or private land, each scheme has required a special Act of Congress, and these Acts could be revoked by Congress at any time. Owing to the uncertainty of tenure there has naturally been some reluctance to invest capital in such undertakings.

By the recent Federal Water Power Act, signed in June, 1920, licenses for such development may now be issued under the jurisdiction of a new body, known as the Federal Power Commission, for a period not exceeding fifty years, at the end of which the license may be renewed, or the Government may take over the enterprise upon compensation of the licensee. In the issuing of licenses, preference is to be given to State and municipal applications. The effect of this Act may be inferred from the fact that, within a month of its being signed, applications for licenses to develop over 500,000 horsepower had been filed. The duty of collecting, recording, and publishing data regarding the utilization of water resources, the water power industry and its relation to other industries, and regarding the capacity, development costs, and relationship to possible markets, of power sites, has also been assigned to this Federal Power Commission.

World's Available Water Power.

During the past few years much attention has been paid to statistics of available and developed water powers. In the case of developed powers, these are usually stated in terms of the capacity of the installed machinery. This machinery is in general only used to its full capacity over a portion of each day, although in many such cases water is available for providing continuous power if desired.

Estimates of potential power are always to be accepted with considerable reserve. In order to make a reasonably accurate estimate, the run off from the catchment area and the variation in this run off from month to month and from year to year, must be known, and it is only in comparatively rare cases that this information is as yet available. Moreover, there is as yet no standard basis on which potential power is computed.

The power available from a given stream during the wet season is many times as great as during the dry season unless sufficient storage is available to equalize the flow throughout the year, and the cost of such storage would in general be prohibitive, even if it were physically possible to provide it.

The United States Geological Survey takes the maximum useful flow of a stream as being that which may be guaranteed during six months in each year. The minimum flow is taken as the average which can be guaranteed over the two driest consecutive seven-day periods in each year, along with the

additional flow which may be obtained during this period of developing any available storage capacity in the upper waters of the stream. Estimates of potential power based on storage capacity are, however, subject to a wide margin of error, owing to the limited data available, and in the following table the potential water power is estimated on the basis of the maximum flow as just defined, in terms of continuous twenty-four-hour power.

Millions of Horsepower

	Available.	Developed.
Great Britain	0.9	0.2
Canada	23.0	3.28*
Remainder of British Empire, including—		
Australia		
Africa (East)		
Africa (South)	30.0	
Africa (West)	to	0.7
British Guiana	50.0	
India and Ceylon		
New Zealand		
Papua		
Austria	6.5	0.57
Brazil	26.0	0.32
Dutch East Indies	5.5	
France	5.6	1.6
Germany	1.5	0.75
Iceland	4.0	1.0†
Italy	4.0	1.25
Japan	8.0	1.5
Norway	7.5	1.25
Russia	20.0	1.0
Spain	5.0	0.88
Sweden	6.2	1.2
Switzerland	4.0	1.4
United States of America	28.0	9.8

*Including projected extensions to plants now in operation.

†Projected but not yet constructed.

Adopting these figures, it appears that the available horsepower of the world is of the order of 200 millions, of which approximately 25 millions is at present developed or is in course of development.

Power Available in Great Britain and the British Empire

With the noteworthy exceptions of Canada and New Zealand, practically nothing had been done, prior to 1915, by any part of the British Empire, to develop or even systematically to investigate the possibilities of developing its water powers. It is true that a number of large installations had been constructed in India and Tasmania, but their aggregate output was relatively inconsiderable.

Since then, however, there has been a general tendency to initiate such investigations, and at the present time these are being carried out with varying degrees of thoroughness in India, Ceylon, Australia, South and East Africa and British Guiana. While it is known that there is ample water power in Newfoundland, Nigeria, Rhodesia, Papua and the Gold Coast, no very definite information is available, nor are any steps apparently being taken to obtain data in these countries.

The Water Power Committee of the Conjoint Board of Scientific Societies, which has been studying the state of investigation and development throughout the Empire since 1917, has, however, come to the conclusion that its total available water power resources are at least equivalent to between 50 and 70 million horsepower.

Of the developed power in the Empire, about 80 per cent. is in Canada. Throughout the remainder of its territories only about 700,000 horsepower is as yet developed, or only a little over 1 per cent. of the power available, a figure which compares with about 24 per cent. for the whole of Europe, and 21 per cent. for North America, including Canada and the U. S. A. These figures sufficiently indicate the relatively large scope for future development.

Power Available in Great Britain

With a view of ascertaining the resources of our own islands, a Board of Trade Water Power Resources Committee was appointed in 1918. This Committee, which has just presented its final report, has carried out preliminary surveys of as many of the more promising sites as its limited funds allowed, and has obtained data from the Board of Agriculture for Scotland, the Ordnance Survey Department, the Ministry of Munitions, and from civil engineers in private practice, regarding a large number of other sites.

As might be anticipated, Scotland, with its comparatively high rainfall, mountainous area, and natural lochs, possesses relatively greater possibilities than the remainder of the United Kingdom, and investigation has shown that it offers a number of comparatively large schemes. Nine of the more immediately promising of those examined by the Committee have an average output ranging from 7,000 to 40,000 continuous twenty-four-hour horsepower, and an aggregate capacity of 163,000 horsepower, while in every case the estimated cost of construction is such that power could be developed at a cost appreciably less than from a coal-fired station built and operated under present-day conditions. The aggregate output of the Scottish schemes brought before the notice of the committee some of which, however, are not commercially feasible at the moment is roughly 270,000 continuous horsepower.

In addition to these, there are a very large number of other small schemes which have not yet been investigated,† and it is probably well within the mark to say that there are water power sites in the country capable of developing the equivalent of 400,000 continuous horsepower, or 1,500,000 horsepower over a normal working week, at least as cheaply as from a coal-fired installation.

A number of attractive schemes are also available in North Wales, though these are in general more expensive than those in Scotland.

Owing to the general flatness of the gradients, there are, except possibly around Dartmoor, no schemes of any large individual magnitude in England, but there are a large number of powers ranging from 100 to 1,000 horsepower which might be developed from river flow uncontrolled by storage.

Investigations on a few typical watersheds throughout England and Wales appear to show that the possible output averages approximately 8 continuous horsepower per square mile of catchment area, which would be equivalent to an aggregate of about 450,000 horsepower. Although much of this potential output is not commercially feasible, it would give the equivalent of 500,000 horsepower over a normal working week if only 30 per cent. of it were fully utilized.

In the report recently issued by the Irish sub-committee of the Board of Trade Water Power Committee, it is estimated that approximately 500,000 continuous twenty-four-hour horsepower is commercially available in Ireland, and that if utilized over a forty-eight-hour working week, its capacity would be at least seven times as great as that of the engine power at present installed in the country for industrial purposes.

It appears, then, that, although the waterpower possibilities of the United Kingdom are small in comparison with those of some more favored countries, they are by no means so negligible as is commonly supposed, even in comparison with the present industrial steam power resources of the country.

†In a paper read before the Royal Society of Arts on January 25th, 1918, Mr. A. Newlands, M. Inst. C.E., gave a list of 122 potential Scottish schemes, the capacity of which he estimated on a very conservative basis at 175,000 horsepower.

The capacity of the fuel power plants installed for industrial and public utility services in the United Kingdom in 1907 was approximately 9.8 million horsepower. Allowing for an increase of 15 per cent. since then, and an average load factor of 35 per cent., this is equivalent to 32,000 million horsepower hours per annum, or to a continuous twenty-four-hour output of only 3.7 million horsepower.

According to Sir Dugald Clerk, the average consumption of coal per horsepower hour in this country is about 3.9 lb., which, on the above basis, would involve a total annual consumption of 55 million tons for industrial purposes, not including railways or steamships. This figure is in substantial agreement with the estimate of 60 million tons made for factory consumption in 1913 by the Coal Conservation Committee of the Ministry of Reconstruction, since this latter figure also includes coal used for heating and other manufacturing processes in factories.

Adopting this figure of 32,000 million horsepower hours as the annual demand for power for industrial purposes, it appears that the inland water power resources of the United Kingdom are capable of supplying about 27 per cent. of this, a proportion which in such an industrial country as our own is somewhat surprisingly large.

Many of the small powers would be well adapted for linking up, as automatic or semi-automatic stations, into a general network of electricity supply, or for augmenting the output of municipal supply works, as has been done so successfully, for example, at Chester, Worcester and Salisbury.

The development of the many small schemes available in the Scottish Highlands would probably have a great effect on the social life of the community. It would go far towards reviving and extending those small local industries which should form an essential feature of the ideal rural township. Commercially, such undertakings may appear to be of small importance, but as a factor in promoting the welfare of the State, economical and political, their influence can hardly be overestimated.

Some of the larger schemes in Scotland would lend themselves admirably to transmission to its industrial districts, while others, in close vicinity to the seaboard, would appear to be well adapted for supplying chemical or electro-physical or metallurgical processes.

While this is admittedly an inopportune moment to suggest anything in the nature of State co-operation in such developments, it may be pointed out that many of the Scottish powers in particular occur in sparsely populated districts, and that, although they would ultimately become remunerative, the difficulty of raising the capital necessary for their development is great. In view of their direct and indirect advantage to the community, it would appear not unreasonable to advocate that financial assistance should be granted by the State in the earlier stages of such developments. If such assistance, say, in the form of a loan maturing after a period of ten or fifteen years, could be granted, it would certainly give an immediate impetus to the development of water power in this country.

Conservation

The importance of water power development from the point of view of conservation of natural resources requires no emphasis. When the value of coal purely as a chemical asset, or as a factor in the manufacture of such materials as iron and steel, cement, etc., is considered, its use as a fuel for power purposes, when any other equally cheap source of energy is available, would appear, indeed, to be unjustifiable.

The consumption of coal in the best modern steam plant of large size, giving continuous output, would be about 9 tons per horsepower year, and on this basis the world's available

water power, if utilized, would be equivalent to some 1,800,000,000 tons of coal per annum. The world's output of coal in 1913 was approximately 1,200,000,000 tons, of which about 500,000,000 tons were used for industrial power purposes, so that on this basis 55,000,000 continuous water horsepower would be equivalent to the world's industrial energy at that date.

Not only does the use of water power lead to a direct conservation of fuel resources, but it also serves to a notable degree to conserve man power. To take an extreme example, each of the 40,000 horsepower units now being installed at Niagara Falls will require for operation two men per shift. It is estimated that to produce the same power from a series of small factory steam plants, over eight hundred men would be required to mine, hoist, screen, load, transport by rail, unload, and fire under boilers the coal required, while, if account be taken of the additional labor involved in horse transport, wear and tear of roads and of railroad trucks and rolling stock, the number would be considerably increased.

Uses of Hydro-electric Energy

While a large proportion of the energy developed from water power is utilized for industrial purposes and for lighting, power, and traction, an increasing proportion is being used for electro-chemical and electro-metallurgical processes. It is probable, indeed, that we are only on the threshold of developments in electro-chemistry, and that the future demand for energy for such processes will be extremely large.

In Norway the electro-chemical industry absorbed 770,000 horsepower in 1918, or approximately 75 per cent. of the total output, as compared with 1,500 horsepower in 1910. Of this some 400,000 horsepower was utilized in nitrogen fixation alone.

The production of electric steel in the U. S. A. increased from 13,700 tons in 1909 to 24,000 tons in 1914, and to 511,000 tons in 1918, this latter quantity absorbing 300 million kilowatt hours, equivalent to almost 400,000 continuous horsepower.

In Canada, in 1918, the pulp and paper industry absorbed 450,000 horsepower, or 20 per cent. of the total, while the output of central electric stations amounted to 70 per cent. of the total.

The electrification, on a large scale, of trunk line railways is also a probability in the not distant future. In the U. S. A., 650 miles of the main line of the Chicago, Milwaukee and St. Paul Railway, comprising 850 miles of track, have been electrified, the power for operation being obtained from hydro electric stations. In France much of the track of the Compagnie du Midi in the region of the Pyrenees has been electrified with the aid of water power; much of the Swiss railway system has been electrified; and the electrification of many other trunk lines on the European continent is at present under consideration.

Quite apart from the probable huge demand in the distant future for energy for the manufacture of artificial fertilizers by some system of nitrogen fixation, agriculture would appear to offer a promising field for the use of hydro-electric power.

Much energy is now being utilized in the U. S. A. for purely agricultural purposes. In California, for example, there is in effect one vast system of electrical supply extending over a distance of 800 miles with 7,200 miles of high-tension transmission lines. This is fed from seventy-five hydro-electric stations, interconnected with forty-seven steam plants, to give a total output of 785,000 horsepower. A further group of thirteen hydro-electric schemes now under construction will add another 520,000 horsepower. A large proportion of this power is used in agriculture, and a census in 1915 showed that electric motors equivalent to over 190,000 horsepower were installed on Californian farms. The Californian rice industry is almost wholly dependent on irrigation made possible by electric pumping.

while most of the mechanical processes involved in farming are being performed by electric power.

There can be little doubt that the economic development of many of our tropical dependencies is bound up in the development of their water power resources. Not only would this enable railroads to be operated, irrigation schemes to be developed, and mineral deposits to be mined and worked, but it would go far to solve the black labor problem, which promises to be one of some difficulty in the near future.

While those outlets for electrical energy which are now in sight promise to absorb all the energy which can be cheaply developed for many years to come, there are many other probable directions in which cheap energy would find a new and profitable outlet. Among these may be mentioned the purification of municipal water supplies; the sterilization of sewage; the de-hydration of food products, and the preservation of timber.

(To be continued)

Ontario Hydro Engineers Submit Alternative Proposals for St. Lawrence Development

Before International Waterways Commission—Two-stage scheme meets with most favor—Difficult to avoid flooding valuable areas

The report of the engineers of the Hydro-electric Power Commission of Ontario, before the International Joint Commission, which has just been presented and discussed before that body, brings home to Canadians in a very forcible way the almost incalculable value of the water powers of the St. Lawrence River. We have been taught to look upon Niagara Falls as the greatest power centre in the world and yet, in the St. Lawrence we have development possibilities equal to more than twice those of Niagara Falls, and, so far as may be judged by a study of the estimates, the cost of development will certainly not exceed that of present-day development at the latter site.

Roughly speaking, the water power possibilities of the St. Lawrence River may be divided into three separate sections:

- (1) From the head of the Galops Rapid to the foot of the Long Sault Rapid, that is, approximately, from Prescott to Cornwall, including the Galops and the Rapide Plat, a fall at Farran's Point and the Long Sault,
- (2) From the head of the Coteau Rapid to the foot of the Cascades Rapid, and,
- (3) From the head of the Lachine Rapid to Montreal Harbor.

These three reaches are separated by two river expansions, known respectively as Lake St. Francis and Lake St. Louis.

In the upper reach, which covers approximately a distance of 60 miles, there is a total fall of a little over 90 ft., 80 or 85 ft. of which can be utilized for power development.

The middle reach, lying between Lake St. Francis and Lake St. Louis, about 15 miles in extent includes three rapids, the Coteau, Cedars and Cascades. The total fall is about 82 ft. of which it is estimated 75 ft. can be made available for power purposes.

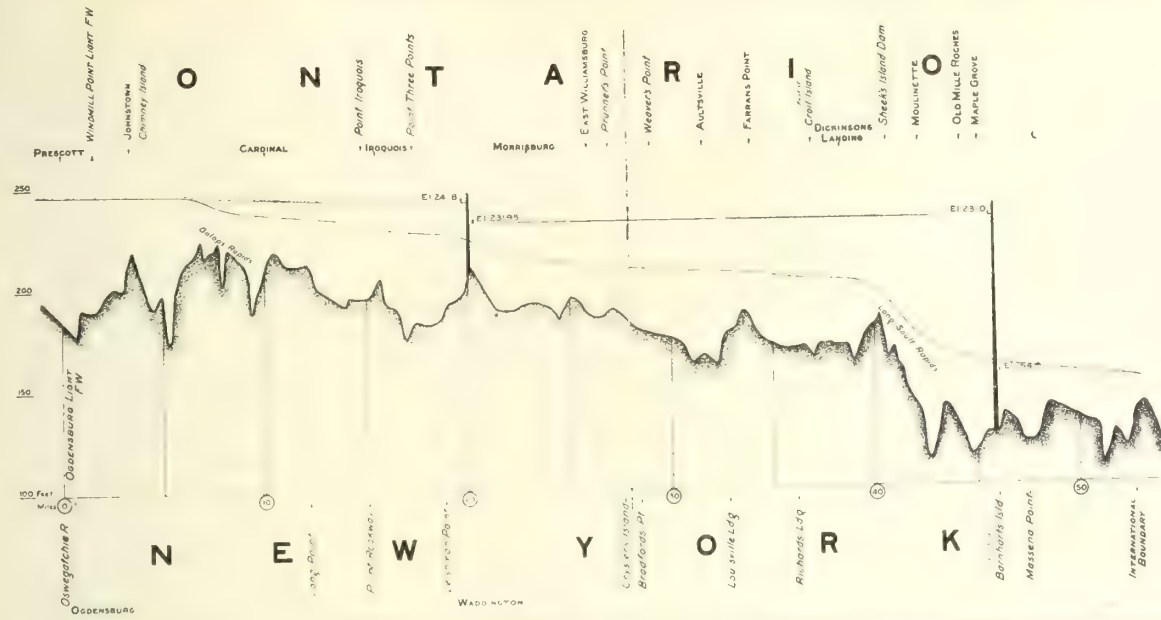
In the third and lower reach, between Lake St. Louis and Montreal Harbor, the total fall, including the Lachine Rapid, is about 45 ft., of which 30 to 35 ft. it is estimated can be made available for power development.

The total power, therefore, in the three rapids amounts to in the neighborhood of four million horse power, of 24-hour power. Of this, about 1,600,000 may be apportioned to each of the two upper reaches and half that amount to the third and lowest reach. Only about 300,000 h.p. has been developed on the St. Lawrence River up to the present time, of which about two-thirds is on the Canadian side.

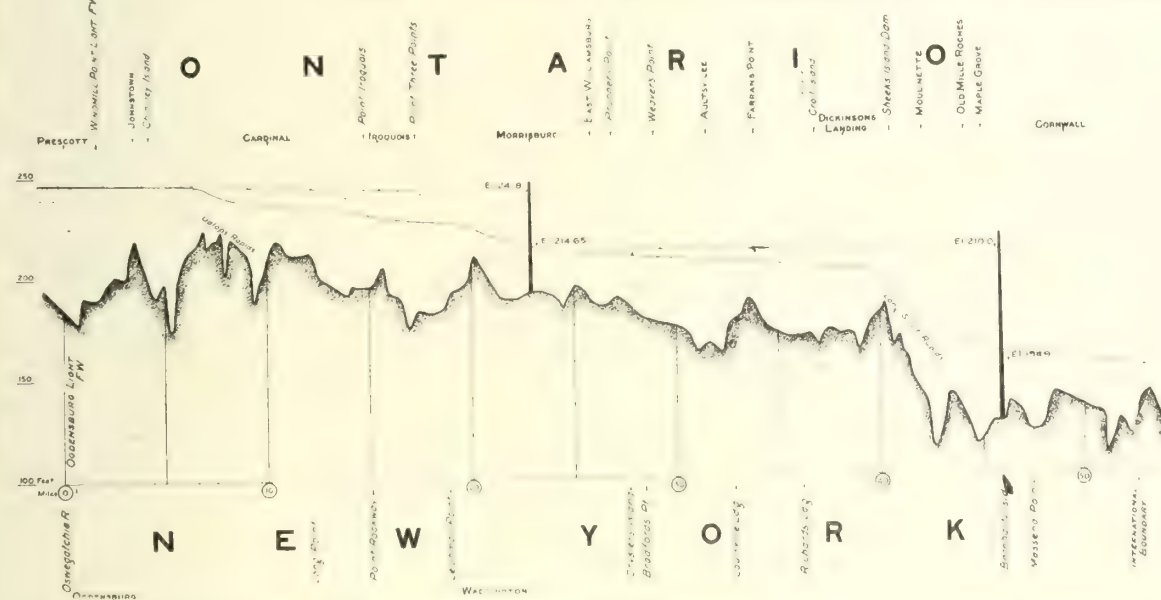
The two lower reaches outlined above are entirely within Canadian territory and, as such, do not fall within the jurisdiction of the International Waterways Commission. The present discussion, therefore, deals entirely with the development of the upper reach, namely, that between Prescott and Cornwall. It will be recalled that a report was recently made by Government engineers, acting for Canada and the United



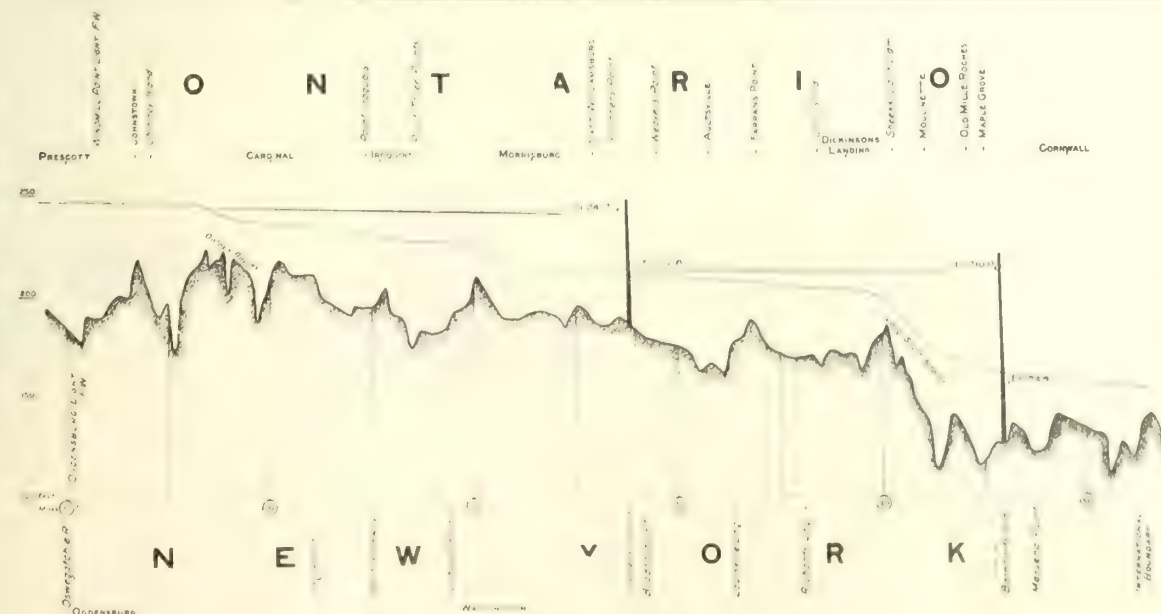
This map shows the section of the River St. Lawrence with which the development schemes of the Hydro-electric Power Commission are immediately concerned. The dams and power houses indicated have particular reference to scheme "B" of the Commission. This is a two-stage development, the first of which is shown at (1), between Morrisburg on the Canadian side and Waddington on the U. S. side. The lower development is at Barnhart's Island, shown at (3). Diversion dams in connection with the "B" development are shown at (2), (6) and (7). Scheme "A" of the commission would utilize an impounding dam, only, in the neighbourhood of (1) but just below Morrisburg, with a 75 ft. head development at (3). This latter also corresponds very closely with the scheme submitted by government engineers to the International Waterways Commission. H. L. Cooper's plan calls for a power house at Cat and Steen Islands, shown at (5). This would operate under about a 40-ft. head. Scheme "C" of the Ontario Commission, which also calls for a double development, locates the upper power house at Chrysler Island, shown at (4) and the lower one at Barnhart's Island. The diverting dam shown at (6) could also be utilized to develop a certain amount of power under about 29 ft. head, with either of the single development schemes.



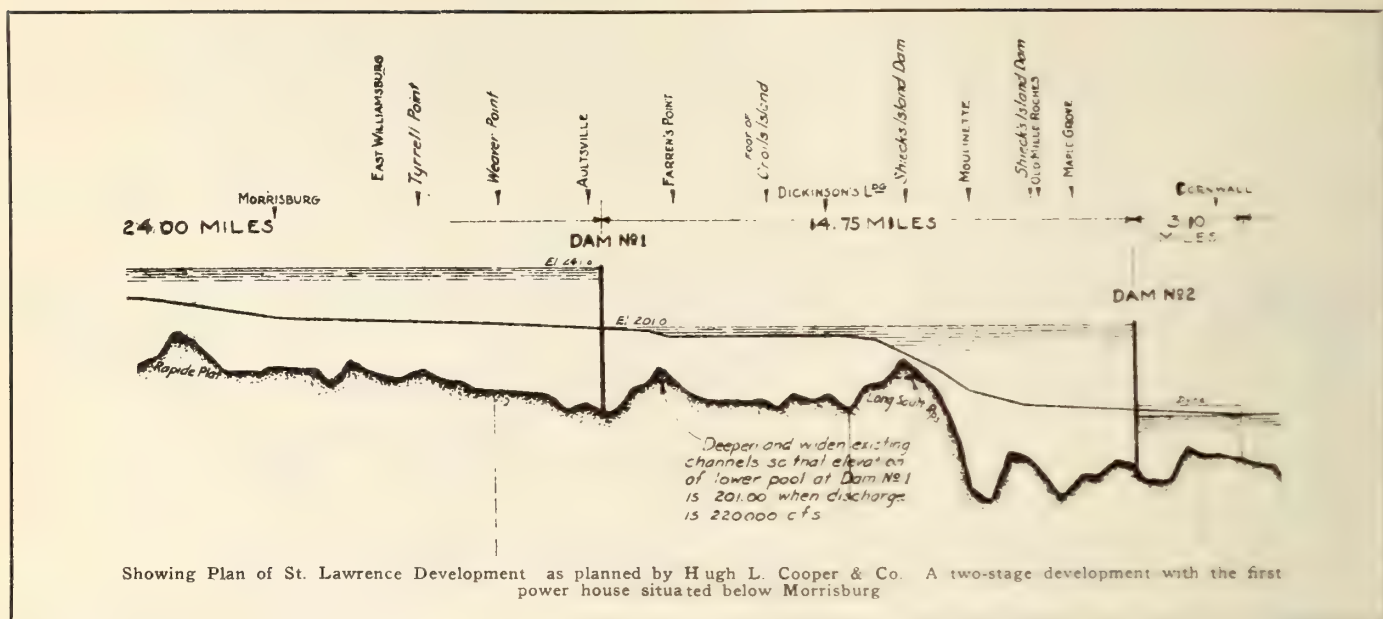
Scheme A of the Hydro-electric Power Commission of Ontario; would flood 29,000 acres valuable land.



Scheme B—A two stage development with many advantages.



Scheme C—Another two-stage development but open to many objections.



States, covering a plan of development of the upper reach. This made provision for an impounding dam just above Morrisburg, where there would be a fall of 8 or 10 ft. and located the main dam at the foot of the Long Sault Rapids with a fall of about 75 ft.

Hugh L. Cooper & Company also recently prepared a report for the International Joint Commission. This report made provision for the development of the upper rapids only of the first reach, locating the power house at Steen and Cat Islands, just opposite Aultsville, a few miles below Williamsburg and Morrisburg.

Both of these schemes had the disadvantage that they flooded very valuable and very considerable areas on both sides of the river, which would either result in the destruction of the towns or necessitate the erection of high, expensive dykes. The town of Morrisburg is an example, as more than half of this town, and the most valuable half at that, would be submerged by these schemes. Mr. Cooper's development plan did not take into consideration the immediate utilization of the Sault Rapids.

The Ontario Hydro engineers studied the question from a number of angles and finally submitted three plans, known as "A", "B" and "C". Of the three plans submitted, however, they consider plan "B" as the most satisfactory. They are briefly described herewith:

Scheme "A"

There is comparatively little difference between scheme "A", as submitted by the Hydro-electric Power Commission of Ontario, and the scheme of the government engineers, recently submitted to the International Waterways Commission. Provision is made for a control dam in the neighborhood of Waddington, N. Y., a short distance up the river from Morrisburg and the power house would be located at Barnhart's Island, at the foot of the Sault Rapids. At this latter point there would be an available head of 74.5 feet. It will be seen that this plan is open to the criticism mentioned in connection with the other two. About 29,000 acres of valuable settled land, including towns and villages would be destroyed unless expensive dykes were erected to protect them. Further difficulties arise in connection with the necessary ship canal. The total development at this point would be 1,492,000 h.p. at a cost of \$141,700,000.

Scheme "B"

Scheme "B" represents a two-stage development. In the upper one would be included the Galops Rapid and the

Rapide Plat; the lower development would include the fall at Farran's Point and at the Long Sault. The upper power house would be located on Ogden's Island and the lower one on Barnhart's Island. The fall at the upper dam would be approximately 27 ft. and at the lower 54.5 ft. The total development would be 1,600,000 and the cost \$154,100,000.

The advantage claimed for this plan is that the area flooded would be much less, only about 6,000 acres; more power to the extent of something over 100,000 h.p. would be made available; also, on account of each of these developments being a smaller proposition, power could be made available in much less time from the upper of these two plants which, naturally, would be developed first.

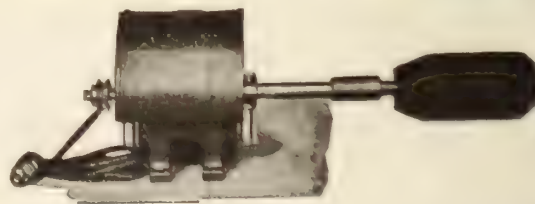
Scheme "C"

Plan "C" is also a two-stage development, the upper dam and power house being placed at Chrysler's Island and the lower power house at Barnhart's Island. This plan would involve the flooding of very considerable areas, including the town of Morrisburg and it is understood the commission does not look upon it with particular favor.

The profiles shown herewith will give our readers a sporting insight into the different schemes of the Ontario Commission. The map indicates the location of the dams and power houses in scheme "B" of the Commission.

Handy about the House

A handy utility about the house is an electrically operated brush on the end of a long shaft like that shown



herewith and which is called, by the manufacturer, an electric bottle washer. It is made by the Electric Sceptile Company, of Stamford, Conn.

Mr. B. C. Taylor, 25 Marchmont, Toronto, Ont., has secured the contract for electrical work on twelve residences being erected on Glendonwyne Ave., Toronto, at an approximate cost of \$120,000., for Mr. John M. Walkley, 326 Shaw Street, Toronto.

Operation at 220,000 Volts.

The first hydro-electric station ever constructed for operation at 220,000 volts has been completed by the Southern California Edison Co. This station has only one 22,500 kw. turbine in service as yet, but plans are laid for six such units. The lines are operating at 150,000 volts temporarily, pending the construction of additional stations on the line, at which time the voltage will be raised to 220,000.

This is the third power house in the Big Creek development of the Southern California Edison Co. Stations No. 1 and 2 have been in operation for a number of years transmitting their output at 150,000 volts to Los Angeles, a distance of 240 miles. The present developed capacity of the three stations is 102,500 kw., but the total development planned will be 929,000 kw. It is on account of this large ultimate capacity that the higher voltage has been selected.

It will be remembered that the ultimate plan of this company calls for the development of power at eight points, and this latest plant is known as No. 8. Stations 3, 4, 5, 6 and 7 have yet to be developed.

All these plants will operate under considerable head. No. 1 operates under 2,130 ft., No. 2, under 2,400 ft., No. 8, under 680 ft. The other plants will operate at heads varying between these two limits as extremes.

The "Electrical World," Dec. 3, has an illustrated description of this plant. The turbine was built by the I. P. Morris Department of the Wm. Cramp & Sons Ship and Engine Building Co. and is designed to develop 30,000 h.p. under 680 ft. head at a speed of 428 r.p.m. It is of the vertical-shaft, single-runner type. The runner is made of bronze and is entirely in one piece.

The generator was manufactured by the General Electric Co. It generates at 11,000 volts.

The transformers are also General Electric and are rated at 8,233 k.v.a., 220,000 volts. The circuit breakers, oil type, G.E. manufacture, are housed in huge cylindrical tanks, one to each phase, and are said to have the largest bushings ever supplied for commercial switches. The breaker complete with mechanism and oil weighs 202,000 lbs.

West Kootenay Power Extending in Okanagan

Extending its power lines from Fairview, 23 miles, to Penticton, at the southern extremity of Okanagan Lake, the West Kootenay Power & Light Company is considering further extensions to reach the cities of Kelowna and Vernon, further north in the valley. That would require extensions at least 75 miles in length by the shortest practicable route. The company has completed its work of constructing the transmission line which brings electric energy from Bonnington Falls generating station on the Kootenay River near Nelson across the Boundary and Kettle Valley districts into the Okanagan. Now the extension first to Kelowna and later to Vernon is planned. Manager Lorne A. Campbell announces that his company will provide for the line to be commenced at an early date and completed by next spring. The city of Kelowna is preparing to submit an agreement to the ratepayers for ratification. The city of Vernon is said to be averse to entering into agreement with the West Kootenay Company. Instead, it is proposed to revive the Shuswap Falls scheme, to generate power at that point, some 26 miles east of Vernon. This power was reported on some years ago and a company then formed which planned a rather large installation. For several years no action has been taken until a public meeting of Vernon citizens favored reviving the project in preference to getting power from the West Kootenay Company.

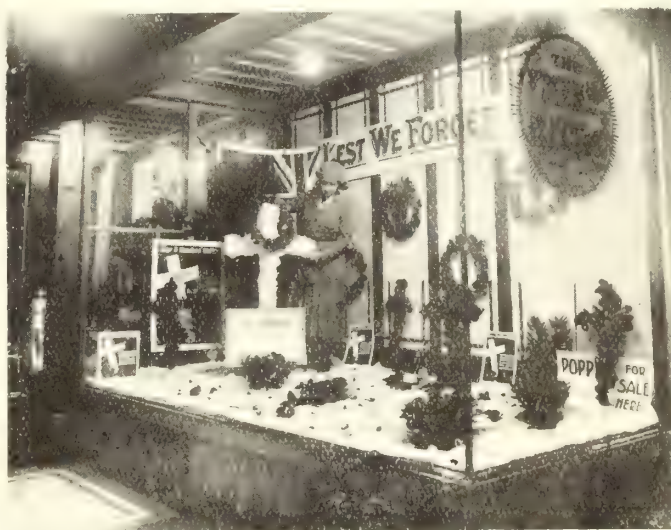
Penticton city council has completed its agreement and the service is now in effect. Under the terms of the ten year contract, the city pays 3 cents per kilowatt hour

for light in bulk. For power the rate is 3 cents per kw. hour up to 30,000 per month, and 2½ cents for over that amount. The company has the right to supply current to industrial concerns in Penticton requiring 50 h. p. or over. The municipality may supply customers outside its boundaries.

Best Poppy Display on Armistice Day

Winning the distinction of having the best dressed window in British Columbia for the purpose, the Veteran Electric Company of Victoria, had a wonderful poppy display for four days, Nov. 8 to 12, assisting the celebration of Armistice Day by urging the purchase of the memorial poppies sold all over Canada on that day for the benefit of war sufferers in France. The accompanying picture shows the effective setting of the window, but it cannot reproduce the equally effective lighting which made the night display most striking.

The members of the Veteran Electric Company are all returned men, and the concern is quite a new venture in



Veteran Electric Co's Poppy Display

Victoria, their place of business at 1413 Government street having been opened for business only on Oct 1 last. The agency for Victoria for Delco Light products, the sale of all sorts of appliances and fixtures, a good stock of which is already carried, and general contracting including all branches of wiring, are included in the company's business. One of the members, Mr. D. A. McClure, is an electrical engineer who has a number of useful electrical inventions to his credit and his inventive genius is always on the alert to make new progress. The other members of the firm, Messrs. H. R. McDonald and C. E. Moon are practical men also, the former giving attention to wiring and the latter making conduit work his speciality.

\$2,000,000 Order From Japan

The Westinghouse Electric International Company announces that it has received from its Japanese agent, Takata & Company, an order from the Daido Denrioku K. K., (the Daido Electric Power Company of Japan), for electrical apparatus for two large hydro-electric plants. The total value of this order is about \$2,000,000. These hydro-electric plants are to form a part of a super-power system for the Tokio District. The current is to be transmitted at 154,000 volts.



BETTER MERCHANDISING



Electrical Dealers Report Christmas Business to date not too brisk.

A number report "Nothing Doing".

Others say "Can get it if I go after it".

Well, why not go after it?

Somebody's going to sell the people Christmas gifts, and that somebody will be the man who hustles.

Throw a coil of barb wire in your easy chair, and get out and "sell".

Dress up your store.

Trim your windows.

Ginger up your staff.

Shake yourself loose from that depressing thought that there is no business and therefore no use making the effort.

Bring the people into your store.

Then "sell goods".

They're all thinking right now—what shall I buy? If it isn't electrical, it will be shoes, or haberdashery, or toys, or jewelry.

They will buy from the dealer who "sells".

How about you? Are you selling goods? —or just keeping a store?

Electrical Co-operative Association, Province of Quebec, Celebrates First Birthday

It is nice to go to a first birthday party of a strong, healthy baby. The Montreal Representative of the Electrical News sends a report of his attendance at the first birthday party of the Electrical Co-operative Association, Province of Quebec, which took place recently in the form of the Annual Meeting, in the lower dining-room of the Windsor Station.

It is natural to hear praises sounded,—no matter how the youngster might be rickety and backward—from the parents and relatives of the youngster, so we will let our own representative, who is just a friend and an unbiased friend, tell the facts.

The spread of the co-operative movement in the electrical field in the Province of Quebec brought together the leading men of the industry in Montreal in the late fall of 1920 to consider ways and means of associating the various branches of the industry throughout the Province in an organization the aims and objects of which would be:

"By education, instruction and co-operation amongst members of the electrical industry to develop and improve the service rendered to the public by that industry.

"To develop a closer co-operation and understanding between central stations, contractor-dealers, manufacturers, jobbers, engineers, architects, telephone, telegraph and railway companies, and other persons or bodies interested in the electrical industry to the end that the efficiency of the various branches of the industry serving the public may be increased.

"To conduct a suitable educational campaign with a view to encouraging the public towards a more extensive use of electricity.

"To educate the public as to the importance of the service rendered by electricity in the development of public industry and welfare."

The incorporation of the Association was accomplished in due time, a commodious and centrally located office at 305 Drummond Building was opened, with Mr. J. N. Mochon as manager-secretary, where meetings of the executive committee, consisting of the following representative men connected with the various branches of the Electrical Industry in the Province of Quebec, were held weekly with the exception of the month of August:—M. K. Pike, chairman; W. O'Brien, vice-chairman; K. B. Thornton, president; J. B. Woodyatt, vice-president; J. W. Pilcher, vice-president; F. J. Parsons, vice-president; N. Simoneau, vice-president; Dr. L. A. Herdt, vice-president; R. J. Beaumont, vice-president; L. C. Haskell, secretary-treasurer; J. A. St.-Amour, De Gaspe Beaubien, W. H. Winter.

The following five outstanding points of work were pursued to accomplish the Association's aims:

(a) To encourage the practice of good business methods.

(b) To endeavour to bring about improvement of methods in all methods of the electrical industry, including accounting, sales, advertising and general store appearance.

(c) To give and conduct demonstrations, exhibitions and displays.

(d) To assist each or any branch of the industry when occasion requires.

(e) To endeavour to obtain fair treatment for invested capital, and to bring about a fair attitude on the part of the public toward electrical development.

Good Financial Support

The financial support of the association during the past year was quite generous; contributions were apportioned and received as follows:

Central stations contributed	43.5 per cent
Manufacturers and jobbers	50.5 per cent
Contractors and dealers	3.7 per cent
Miscellaneous	2.3 per cent

The association was able to make very satisfactory joint arrangement with the very popular, in Montreal, "Electrical Luncheon Club," and change it into the "Electrical Co-operative Luncheon" which is held every Wednesday.

Interesting addresses by prominent speakers were given both on purely electrical and on general topics at the luncheon meetings. This affiliation proved to be very congenial and beneficial to the members individually and to the Association.

The development of a co-operative movement in the Province of Quebec presents difficulties that no other part of the Dominion or even of the whole North American continent does. All the work has to be carried on with the use of both the French and English languages. All of the association's publications, stationery, etc., have to be printed in two languages.

Despite all this the following was accomplished in the space of one year during which a great deal of time had to be given to the drawing together and getting personally acquainted of the many and various electrical men and interests in the province.

What Was Accomplished

Many of the problems of the Contractor-Dealers Associations, French and English, have been discussed; officers of the association have attended meetings of these sections and addressed their members in explanation of the co-operative movement.

The association was instrumental in causing certain rules to be formulated and approved by the Canadian Fire Underwriters' Association concerning matters of public safety in connection with service entrances, all of undoubted benefit to each section of the association and to the general public.

In the education of the public to the use of electrical equipment and appliances, descriptive bilingual pamphlets have been distributed of "The Modern Home" containing information and diagrams of properly wired houses to every architect in the province of Quebec. Another, "The Comforts and Conveniences of Electricity in the Home" has been distributed to the general public. The distribution of these booklets is regarded as being one of the most important steps taken by the association in the line of education so far.

Working the educational plan, a permanent electrical exhibition was opened up in Montreal at the Uptown Power Building, 605 St. Catherine Street West. Member companies of the association have co-operated to carry on this exhibition at these premises as well as in other parts of Montreal, where advantage is taken of demonstrations of electrical equipment and appliances to a large number of people.

An Electrical Home

In conjunction with the property owners a model electrical home was exhibited in the town of Mount-Royal, known as Model City, and was opened to the public. It is estimated

that nearly 20,000 persons visited this Model Home. Every electrical appliance that could be used in the home was installed and their uses demonstrated to the public, who, it can be said, were thoroughly interested and pleased with the exhibition.

Activities of the Association during its first year were principally confined to the city and district of Montreal. Nevertheless, the Association undertook its establishment in the city of Quebec and with the co-operation of the local branches of the industry, a most successful organization meeting was held there.

Through the courtesy of the Canadian Electrical Association a smoker concert, given to the delegates at its annual convention in Quebec in June 1921, was run off under the auspices of the Electrical Co-operative Association, Province of Quebec and addresses were given by Mr. Milan R. Bump, president of the National Electric Light Association and by Messrs. Goodwin and Chase on the subject on the subject of co-operation and the aims and objects of such an association.

The Officers and Council for the year 1921-1922 are as follows:

Hon. President:—J. S. Norris, vice-president and general manager Montreal, Light, Heat & Power Consolidated.

President:—K. B. Thornton, general manager Montreal Public Service Corporation.

Vice-Presidents:—J. B. Woodyatt, general manager Southern Canada Power Co. Ltd.; J. W. Pilcher, district manager Canadian General Electric Co. Ltd.; M. K. Pike, general sales manager Northern Electric Co. Ltd.; F. J. Parsons, managing director The McDonald & Willson Co. Ltd.; N. Simoneau, Simoneau Electric Contracting Co.; Dr. L. A. Herdt, McDonald Prof. of Elec. Engineering, McGill University; R. J. Beaumont, general manager, subsidiary distribution companies, Shawinigan Water & Power Co.

Honorary Secretary-Treasurer: L. C. Haskell, secretary-treasurer, Southern Canada Power Co. Ltd.

Manager-Secretary: Louis Kon.

Advisory Council

Central Station Representatives:—W. O'Brien, manager New Business Department, Montreal Light, Heat & Power Consolidated; L. C. Haskell, secretary-treasurer, Southern Canada Power Co. Ltd.; N. L. Engel, New Business Department, Montreal Public Service Corporation; W. J. Lynch, general manager, Quebec Railway, Light & Power Co. Ltd.

Manufacturers' Representatives:—C. Duncan, managing director Duncan Electrical Co. Ltd.; Geo. Wight, managing director and secretary-treasurer Monarch Electrical Co. Ltd.; C. F. Medbury, district manager, Canadian Westinghouse Co. Ltd.

Jobbers' Representatives: J. W. Pilcher, district manager, Canadian General Electric Co., Ltd.; M. K. Pike, general sales manager, Northern Electric Co., Ltd.; S. W. Smith, president, Electrical Equipment Co. Ltd.

Contractor-Dealers' Representatives: J. A. St-Amour, electrical contractor, Montreal; F. J. Parsons, managing director, The McDonald & Willson Co. Ltd., Montreal; J. A. Anderson, manager J. A. Anderson & Co.; L. D. Mead, manager Mead Electrical Co.; Wm. Rochon, contractor, 454 Park Lafontaine; R. H. Doddridge, manager, Quebec Electric Co., Quebec, P. Q.; W. Wiggett, Wiggett Electric Co. Ltd., Sherbrooke, P. Q.

Consulting Engineers: De Gaspé Beaubien, Montreal; J. M. Robertson, J. M. Robertson & Co., Ltd.

Public Utility Company Representatives: H. R. Mallison, assistant to president and purchasing agent, Montreal Tramways Co.; J. A. Shaw, electrical engineer, Canadian Pacific

Railway; W. H. Winter, general superintendent of plant, Bell Telephone Co. of Canada.

The Executive Committee remains the same as last year with the addition of Mr. J. A. Anderson of J. A. Anderson & Co.

Mr. W. L. Goodwin, assistant to president of Society for Electrical Development, was present at the annual meeting upon invitation of the executive, and among other remarks made the following reference to the year's record of the Association: "the marked presence of friendly feeling existing among those present at this meeting is one of the best proofs of the accomplishments of the Association; I compare this with the lack of even personal acquaintanceship among the many men connected with the various branches of the Electrical Industry which was very strongly displayed a year ago when the conception of organizing your Association was first decided upon. Mutual understanding and friendly personal feeling among the fraternity whose object in business is to make electricity as popular as bread and butter are has to be based on mutually friendly relations and co-operation. Your Association seems to be well on the way of accomplishing it."

Another of Hamilton's Activities

This poster shows one of the activities of the Hamilton Electrical Development League in connection with the Christmas trade. One of the most fruitful sources of fire trouble at Christmas time is the use of candles on a tree.



Poster distributed by Hamilton's Electrical League.

tree, which smokes, fumes and becomes seriously inflammable. This poster is designed to impress on the public the fact that electric light represents the best means of preventing fires.

Activities Vancouver Association Electrical Contractors and Dealers

Active membership in the Vancouver Association of Electrical Contractors and Dealers has increased 60 per cent in the four months ending November 30th, 1921. This revival of interest in the association is largely due to the activities of the Electrical Service League of British Columbia in the trade, in the city of Vancouver and the adjacent municipalities. At the present time it is actively engaged in assisting the Service League in the furthering of two campaigns for "Better Business", viz., the co-operative advertising campaign to promote the sale of electrical appliances as Christmas gifts and the Industrial Lighting Exhibit.

Recently an election of officers was held for the year ending November 1, 1922, and the following officers elected:

President: C. C. Carter, Carter Electric Company.

Secretary-treasurer: P. F. Letts, Letts Electric Company.

Executive committee: Sidney Darnborough, Mundy,



Mr. Percy F. Letts

Rowland & Co; S. E. Jarvis, Jarvis Electric Company; J. C. Reston.

Ex-officio: W. W. Fraser, retiring president; C. C. Carter; P. F. Letts.

Members of the advisory council Electrical Service League of British Columbia: C. C. Carter; W. W. Fraser; E. Brettell.

The association voted to remain affiliated with the National Association of Electrical Contractors and Dealers instead of joining forces with the contractor-dealer associations of the Pacific Coast States. With the impetus received through the activities of the Electrical Service League, the association is looking forward to an active successful year under the new officers.

Victoria, B.C., Electrical Association

Under the auspices of the Electrical Service League of British Columbia, the electrical industry of Victoria, B. C. has organized the Victoria B. C. Electrical Association. The organization was completed Nov. 24th, 1921, at which time the various representatives of the central station, the manufacturers and jobbers and the contractor-dealers met in the offices of the B. C. Electric Railway Company, Ltd. and adopted a constitution modeled upon the constitution of the Electrical Service League of British Columbia.

The objects of the association are:

(a) To develop the electrical industry by educational methods, encouraging the practice of good ethical business methods and of improved service to the public.

(b) To develop a closer co-operation and understanding

between central station, contractor-dealers, manufacturers and jobbers to the end that the efficiency of the various branches of the industry serving the public may be increased and that the customer may obtain better electrical service.

(c) To help the contractor-dealers improve their business methods, including accounting, sales, advertising and general store appearance thereby elevating the plane of the retail branch of the industry.

(d) To form a recognized body to promote electrical development to support each branch of the industry when occasion requires and obtain fair treatment for invested capital on the part of the authorities by working for a fair attitude toward electrical development on the part of the public at large.

The following officers were elected for the ensuing year:

A. T. Goward, manager B. C. Electric Railway Co. Ltd., Victoria, honorary president; S. J. Halls, sales engineer B. C. Electric Railway Co. Ltd., president; R. T. Murphy, Murphy Electric Co., vice-president; H. G. Miller, Canadian General Electric Co., secretary-treasurer; E. C. Hayward, Hawkins & Hayward and F. B. Fox, Fox & Mainwaring, auditors.

The first work of the association is to be the promotion of the electrical appliance idea for Christmas gifts. Following out the Christmas plans of the Electrical Service League of British Columbia, the Victoria Association has adopted the slogan "Say Merry Christmas Electrically". Cards showing the cost of operation of appliances, based on the rates obtaining in Victoria, are being displayed for the first two weeks in December. This educational campaign is to be followed by a week of co-operative advertising in the local papers, which united effort should sell the electrical idea to the Christmas trade and at the same time knit together the various branches of the industry in Victoria.

Electricity in Lumber Industry

The December issue of the Western Lumberman devotes a number of pages to electricity in the saw mill, pointing out that electrical energy has many arguments in its favor, including extreme flexibility of installation and operation, conveniences and simplicity. The issue includes a number of interesting articles and detailed information on a number of western mills, and the results that have been obtained through electrification. One of the mills described is that of the Canadian Robert Dollar Company. Another article deals with electric motors on head saws. The value of better lighting in the saw mill comes in for its share of attention, in addition to a couple of good practical articles on the use of electricity in the lumber mills and the lumber industry in general.

Mr. Kenneth L. Warren has been retained as consulting engineer by The Avon River Power Company, Ltd., Windsor, Hants County, N. S., who are planning a large hydro-electric development near that place. We are advised that immediately upon completion of the preliminary field survey, Mr. Warren will institute an active construction program.

Messrs. Taylor Bros., 25½ Norwood Ave., Toronto, have been awarded the contract for electrical work on 11 residences being built on Milverton Blvd. near Glebe Mount Ave., Toronto, at an estimated cost of \$5,000 each.

The McNaughton-McKay Electric Company, Windsor, Ont., has been awarded the electrical contract on a new bank building being erected at Devonshire & Wyandotte Sts., Walkerville, Ont., for the Royal Bank of Canada, at an estimated cost of \$12,000.



Beattie-McIntyre, 72 Victoria St.



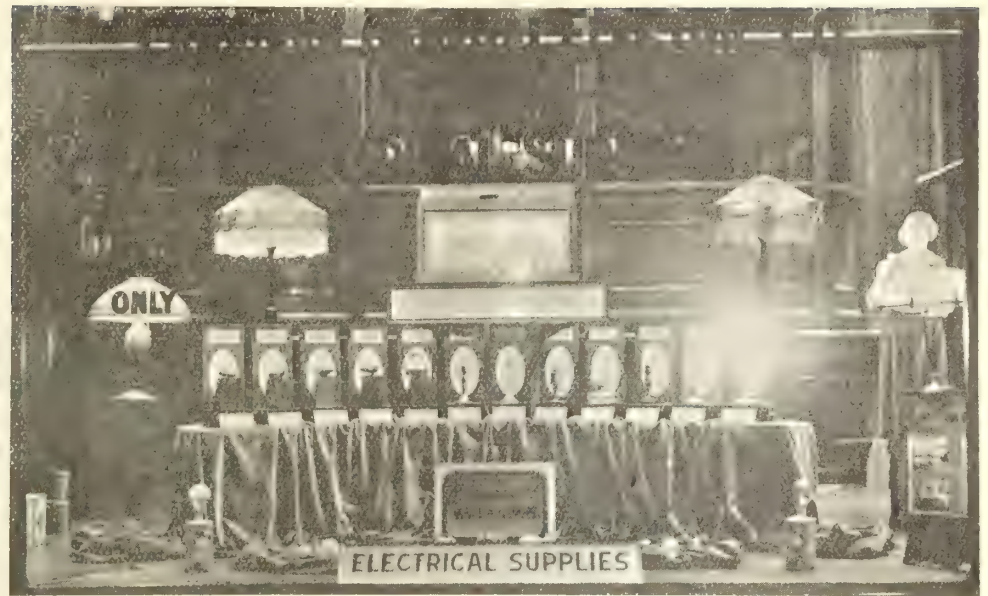
High Efficiency Lamp Co., 413 Yonge St.

Some Toronto Dealers who were early prepared to give Christmas Service.

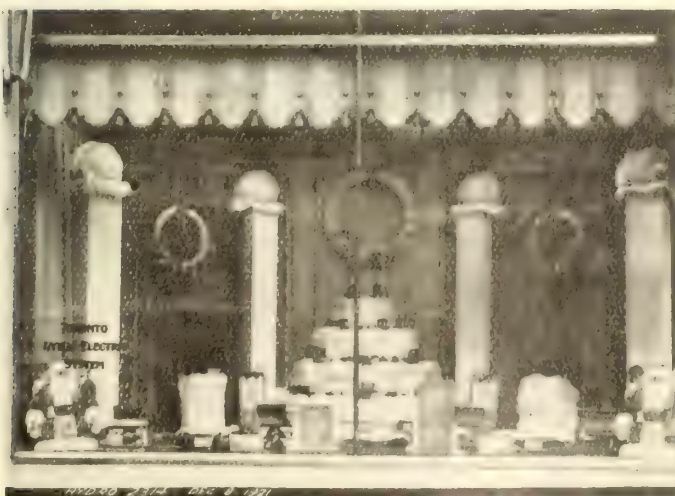


E. A. Drury, Danforth Ave. A small electric train, operating, and flashing lamps add life to this display.

The Canadian General Electric window shows the evolution of the modern lamp.



Brooke & Bastedo, 703 Yonge St., in their new store.



Toronto Hydro, 226 Yonge St



R. A. L. Gray & Co., 85 York St

"Real Time" on the 28th

The regular monthly meeting of the Toronto Section of the Electrical Contractors and Dealers Association of the Province of Ontario was held on December 13 at Bingham's, 84 Yonge St. Following the dinner a report was presented by the Wage Committee and also on the "Electric Home." Other business included the appointment of a Nomination Committee who will select officers for the coming year.

This meeting was largely preliminary, however, to a big Euchre and Dance which is being held on December 28, also at Bingham's. A similar meeting in the month of November was so successful that the executive felt they could not do better than hold another. It was universally agreed that bringing the wives of the contractor-dealers into the Association would result very advantageously to the industry, as their influence would often be more direct than would that of the male species. George Cross says they will have a "real time" on December 28. Don't forget the date. It is just half way between Christmas and New Year's and it starts at 8.30 o'clock, Bingham's Rainbow Room, 84 Yonge St.

R. & M. Convention

The annual sales convention of The Robbins & Myers Company was held at Springfield, O., Nov. 25 to 29 inclusive. Representatives from all domestic branches, the export office and The Robbins & Myers Company of Canada were in attendance. Sales and advertising plans for 1922 were explained and discussed. Considerable time was spent with the Engineering Department where recent improvements in design and construction were explained. A decided spirit of optimism was prevalent at this meeting. Nearly every delegate reported business on the upturn in his territory and expressed the belief that a marked improvement would soon be shown.

Hoover Christmas Campaign

The Hoover Suction Sweeper Company of Canada, Ltd., through their main office at Hamilton, Ont., are supplying to their dealers for distribution to prospective purchasers, a special Christmas leaflet which they have gotten out featuring the Hoover as a Christmas gift. The company will also supply to their dealers a special Christmas window card, and Hoover Week will be celebrated, as in previous years, from December 8th to December 15th, when their dealers will be asked to put on special displays, both in their stores and in the windows. The Hoover company is also conducting at the present time a big International sales contest, which commenced October 3rd, and which will continue until December 31st. This contest is between the 10 different sales divisions in the United States and Canada, and also between the district managers and resale men in the different divisions and districts for very valuable prizes. Points are given to the divisions for sales to dealers, and to the district managers for sales to dealers, and the dealers' newspaper advertising, and to the resale men on the machines actually sold. The company believes that this big contest will insure their dealers a very close co-operation from the district managers, and help the dealer dispose of large numbers of Suction Sweepers between now and the end of the year.

The Hydro-electric System of Wallcerville, Ont., of which Mr. M. J. McHenry is secretary-manager, is having plans prepared for a building to be used as an office and salesroom for electrical appliances. It is understood tenders will be called for about the first of January, 1922.

Mr. Fisk Assumes Important Position

Mr. Harold B. Fisk who was recently appointed manager of the Walsh Plate & Structural Works, Limited, at Drummondville, Que., was born in England, 1885. He was educated at the Bishops Stortford Grammar School, and Kings College, London. After serving as a pupil with Baily, Grundy & Barrett, a firm of mechanical and electrical engineers, at Cambridge, England, he came to Canada in 1907, entering the service of the Shawinigan Water & Power Company as operator in the Montreal Terminal Station, being shortly transferred to the head office of the company, in Mon-



Mr. H. B. Fisk

treil. Mr. Fisk also saw service with the British Canadian Power Company, at Cobalt, (now the Northern Ontario Power Company Ltd.), being first assistant to the general superintendent and afterwards superintendent of the Mata-bitchouan River Power Development; also with the Toronto Power Company, at London, Ont.; the Kaministiquia Power Company at Fort William, Ont., and from 1916 to his present appointment with the Southern Canada Power Company as superintendent of the Drummondville division. Mr. Fisk was admitted a member of the American Institute of Electrical Engineers, August 1919.

Oil Filled Radiators

Our subscribers frequently write us for information, which, in the main, is given privately. Occasionally, however, these questions and the answers thereto are of very general interest. For example the following letter. Our readers are asked to remember that it is a pleasure for us to give this service. If we haven't the correct answer we'll get it; and if we can't get it we'll say so plainly:

Question—We should like to know if there is such a thing being manufactured as an Electric Radiator which is filled with oil in place of water for heating garages as we have had several enquiries for something to heat garages when they cannot be heated by steam or hot water. We should appreciate any information you could furnish us regarding same.

Answer—There is no electric radiator of the kind you mention now being manufactured in Canada, or, we believe, elsewhere. The Salisbury Electric Company manufactured such a radiator some years ago, but discontinued it. We believe, also, a few radiators of this kind were made by a United States firm, the manufacture of which has likewise been discontinued.

Newest Developments in Electrical Equipment

The Bryant Electric Company has recently placed on the market a manually operated hospital signal system control switch. This is a toggle switch which is operated by a pull on a linen cord, one advantage claimed for it being that the cord may be changed for a clean one when soiled. The illustrations show the appearance of this switch, (1) when installed, (2) phantom view in open position, illustrating the ample breaking space, (3) phantom view showing switch in closed circuit position and illustrating the "kick off" feature



Fig. 1



Fig. 2



Fig. 3



Fig. 4

which prevents the mechanism from sticking and failing to operate, and (4) phantom view showing switch in closed position; as long as the patient holds the switch in this position the bell signal operates.

The Horton Ironing Machine

McDonald & Willson, Toronto, are selling the Horton Ironing Machine shown in the illustration. The electric ironer promises to become as popular as the electric washing machine. One of the objections sometimes raised against them is that they only take care of a part of the



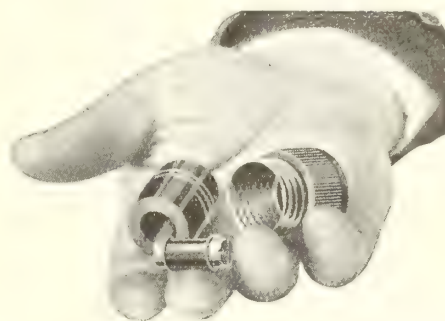
household ironing, but the Horton machine lists the following operations which seem to include just about everything:—Aprons, sheets, towels, napkins, hosiery, pajamas, bedspreads, handkerchiefs, underwear, blankets, mufflers, sweaters, soft shirts, lace curtains, table cloths, soft collars, wash ties, pillow cases.

The ironing element in this machine is heated by gas and the roll is motor operated. McDonald & Willson are distributing an interesting booklet explaining the advantages of the machine.

The Canada Electric Company's tender of \$1,325. for electrical wiring of Kimberly School, Toronto, has been accepted by the Board of Education.

A New Renewable Fuse

The Cote Bros. Manufacturing Corporation of Chicago are manufacturing a renewable fuse claimed to be so simple that anyone can refill it and put a line back into operation. It is of the Edison type, for use on circuits of 125 volts with ratings from 3 to 30 amperes. The fuse, as shown in the figures, consists of three parts, the body, the cap and the refill. The cap and body are of heat resisting molded



insulation, and are built in generous proportions due to the first cost of these parts being the only cost. Because of this heavy construction, they cannot be harmed either by dropping or by the repeated blowing of the fuse element. The refill is a cartridge, properly vented for the emission of the gases when the element vaporizes, and has the rating of this element stamped on both ends so that it is always visible through the aperture, regardless of how it is inserted in the body. The main feature claimed for this fuse is the ease with which it is renewed. The refilling consists of merely dropping the cartridge into the cup-like body and screwing down the cup.

Niagara Contractor-Dealers Discuss Advertising and Window Display

The regular monthly meeting of the Niagara Peninsula Branch of the Ontario Association of Electrical Contractors and Dealers, was held in the Chamber of Commerce Rooms, St. Catharines, Wednesday, November 30th.

After dinner the usual order of business was disposed of, following which Mr. H. H. Rimmer of the Canadian General Electric Company gave a very helpful and instructive talk on "Advertising," illustrating parts of his subject by means of word pictures and diagrams on a large chart, showing how important it is for electrical dealers to analyze their business methods and how they may correctly write up newspaper ads to hold public attention. Mr. Rimmer also again drew attention to the wonderful field there is for the sale of electrical appliances.

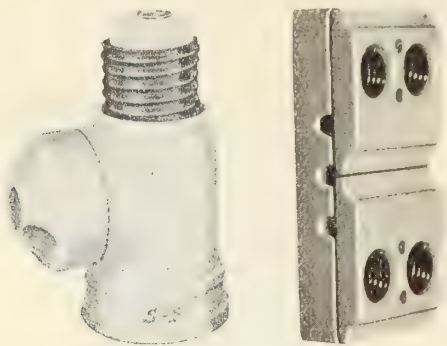
Mr. F. C. Medland followed with a talk on "Window Dressing" showing a large number of photographs displaying several styles of well dressed store windows. Mr. V. K. Stafford was present and helped out in the discussion which followed Mr. Rimmer's and Mr. Medland's talks.

Mr. W. Mackenzie, Sterling Electrical Company, is secretary of the Niagara Peninsular Branch.

The Canadian Engineering Standards Association are issuing a little booklet, entitled "Standard Requirements for Single Phase Distribution Transformers," for which they are charging the nominal sum of twenty-five cents. Requirements as noted in this booklet have been drawn up, primarily, for the use of manufacturers and purchasers and are intended to express the recognized Canadian practice as to the standard sizes and construction of single phase, oil-insulated, distribution transformers.

Cutout Made in Canada

Smith & Stone, Ltd., electrical manufacturers of Georgetown, Ont., are gradually adding to their list of manufactured lines, which includes sockets, receptacles, lamps, rosettes and cutouts of various types. The illustration shows two of their



devices. They claim to be the only Canadian manufacturers of this type of cutout. The porcelain current tap was recently approved by the Hydro-electric Power Commission of Ontario.

Electrically Heated Chocolate Warmer

A new chocolate warmer just placed upon the market by the Westinghouse company, consists of a sheet metal pan in which the chocolate to be melted is placed, and a hermetically sealed sheet metal retaining vessel which contains the heating element. The indicating re-heat snap switch, with six feet of flexible cord, is also furnished. The high position of the switch is used when it is desired to bring the chocolate to a working temperature in a short time; the medium heat when longer time is available, and the low heat for main-



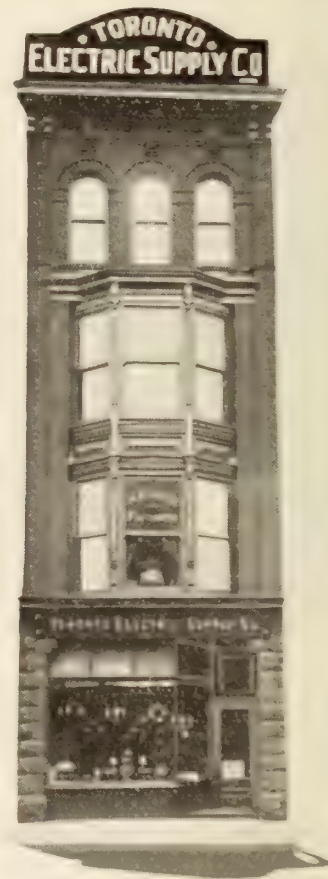
taining the chocolate at the proper working temperature. The chocolate warmer may be mounted on the top of a table and the marble slab placed under the horizontal lips. It is customary to install the chocolate warmers in a row down the centre of the table, so that two different dippers on opposite sides of the table can operate from each warmer. The control switch is mounted in a convenient position but usually is placed at the side of the table. The constant uniform temperature of the electrically-heated chocolate warmer insures a consistent quality of high-grade product.

Electric Page Growing in Popularity

The list of cities publishing electric pages is growing apace. In the province of Ontario, it now includes Ottawa, St. Catharines, Kitchener, Hamilton, Windsor and Brantford. In Hamilton the enthusiasm is so great that it requires three full pages to deliver the industry's message to the people. In other provinces, the idea is taking hold, notably in Manitoba and in British Columbia. In the near future every Canadian city and fair-sized town may have its weekly electric page. It is a splendid weapon for fighting that demon "depression."

Toronto Electric Supply in New Quarters

The Toronto Electric Supply Company has taken over new quarters at 36 Adelaide St. West, Toronto, (formerly occupied by Central Electric Supply Co.,) including all three floors. The first floor is being used for general supplies and fittings; the second will be devoted to sales and demonstrations of fixtures and appliances, portable lamps, heaters,



washing machines, irons, etc. These display rooms are very suitably arranged for the convenience of contractors and dealers, and their customers, and are claimed to be one among the largest and most attractive in Canada for this purpose. Arrangements have also been completed under which a complete line of supplies, lighting fixtures and appliances will be carried at 1851 Gerrard St. East for the convenience of east end customers.

Installed Steamer's "Electric Equipment"

The entire electrical installation on the handsome new Canadian Pacific coast passenger steamer Princess Louise has been the work of Messrs. Mundy, Rowland & Co., electrical engineers, Standard Bank building, Vancouver. The vessel had her trial trip on Nov. 30th at Victoria. She was built at the Wallace Shipyards, North Vancouver, and since the launching some time ago, her housing and interior fitting has been completed. In electrical equipment and appointments, as in all other features of her construction, this fine passenger vessel is the equal of the best produced in any of the older shipbuilding countries. On her trials the vessel was inspected by a large number of prominent shipping men, who were united in their praise of her construction and appointments.

"Joe" Chamberlin to North Bay

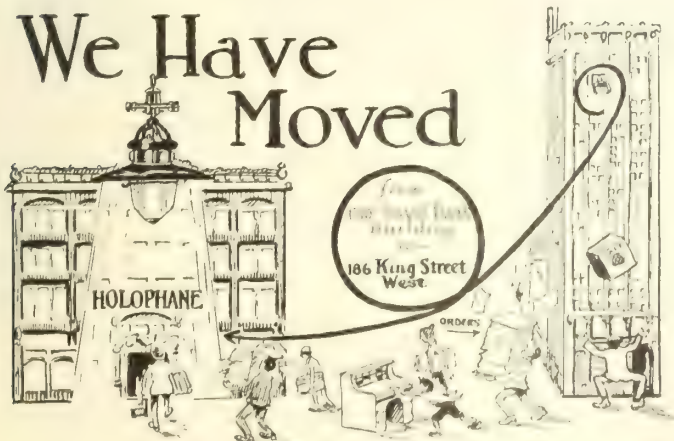
The Electric Supply Company, North Bay, has been re-organized and, in addition to their present business will operate a wholesale department, carrying a complete stock of electrical supplies and catering to the trade in Northern Ontario. North Bay is an excellent location for such a business, being the centre of distribution for the North country and being on four railroads having six branch lines. The local branch of the business will continue under the management of Mr. J. W. Alger, who has been in the electrical business in North Bay for the last nine years, and the wholesale department will be managed by Mr. P. M. (Joe) Chamberlin, who is well known to the electrical trade in Ontario, having been connected with the sales departments of the Northern Electric and the Victoria Electric Supply Companies for the last fifteen years.

The Man Who Fails

The man who fails is the sort of a chap
Who is always looking around for a snap;
Who neglects his work to regard the clock;
Who never misses a chance to knock.
He is grouchy and slow when work begins;
When it's time to quit, he jokes and grins.
He's always busy as busy can be
When he thinks the boss is around to see.
He believes that a "pull" is the only way
By which he can ever draw bigger pay;
And he sulks and growls when he sees his plan
Upset by the "push" of another man.
He's on the job when he draws his pay;
That done, he soldiers his time away;
While the men who tackle their jobs with vim,
Keep pushing and climbing ahead of him.
For the man who fails has himself to blame,
If he wastes his chances and misses his aim;
He'd win, if he'd use his hands and wits;
The man who fails is the man who quits.

—Trumbull Cheer.

The Great West Electric Co. Ltd., Winnipeg, have removed from 61-63-65 Albert Street, to 87 King St. Winnipeg. The new premises were purchased by the company last year to take care of the future expansion of the business, which has been making rapid strides during the past few years.



Frank T. Groome announces Holophane's removal to new quarters

Notes of the Trade

The St. Thomas Hydro-electric Commission is refunding to hydro users approximately \$12,000., which represents surplus earnings during the past year. The distribution is in proportion to the customers' bills.

Messrs. Richardson & Cross, 81 King St. E., Toronto, have been awarded the contract for electrical work on an addition being built to the office building of the Merchants Fire Insurance Company, 86 Adelaide St. E., Toronto.

Messrs. Harris & Marson, 81A Parkway Ave., Toronto, have been awarded the contract for electrical work on an addition and alterations being made to the building of the Merchants Bank of Canada at Manning & College Sts., Toronto.

The Salisbury Electric Company, 36 Toronto St., Toronto, has been awarded the contract for electrical work on an artificial ice plant being erected on Gerrard St. E., near Sackville St., for Chapmans, Ltd., at an estimated cost of \$70,000.

The Woodstock Hydro-electric Commission have announced their decision to proceed immediately with plans for a new hydro building. Competitive designs will be called for. The estimated cost is in the neighborhood of \$75,000.

Vancouver City School Board has contracted with the United Electric Co., to supply Edison Mazda lamps for one year from Oct. 5, on the following basis: Annual purchase, \$600, 27 per cent discount from list prices; annual purchase \$1200., 29 per cent from list prices.

Mr. C. W. Chadwick recently sold one of his branch electrical businesses, that located at 403 Barton Street East, Hamilton, to Mr. F. Woods, who had been his manager of this store for the past two years. We understand that Mr. Chadwick disposed of this business in order to be able to devote his whole time to the increasing business of his wholesale warehouse, as well as his two other electrical stores on King Street East.

Mr. F. Woods recently purchased the electrical branch business store at 403 Barton St., Hamilton, of Mr. C. W. Chadwick and is carrying a good stock of up-to-date fixtures and supplies. Mr. Woods, who has been engaged by Mr. Chadwick for the past two years as manager of this store, is in a good position to handle the business of this district. The store is well lighted and otherwise equipped and carries a good window display.

W. W. Fraser, electrical engineer, Vancouver, has been given the contract, by the Dominion Department of Public Works, to install the new generating equipment for the electric service at William Head Quarantine Station, near Victoria. The plant includes a new Diesel engine of 60 h.p. and a generator of 30 kw. capacity. The work is being done at the present time.

H. Barron, electrical engineer, Yew and 3rd Ave., Vancouver, has been remodelling his show windows, and otherwise improving his means for display of electrical appliances—taking a little of his own medicine, as it were, for he specializes in window lighting, also in industrial installations.

Electric Railways

Rehabilitation of Toronto's Street Railway System—I

This is the first of a series of articles that will describe, in detail, the various phases of this important work.

The Toronto Transportation Commission, on September 1, 1921, formally took over the operation of the Toronto Railway Company's system. This was in virtue of the expiration of the franchise under which the Toronto Railway Company had operated for thirty years.

A vigorous rehabilitation program was at once initiated by the Transportation Commission. This commission, having been appointed in advance, had laid the foundation of an organization in preparation for immediate and extensive activities as soon as they gained possession of the railway system.

The work of rehabilitation, demanded by a modern service such as the commission was instructed to give the citizens of Toronto, consisted, in the main, of the following:

- (1) Replacing tracks considered unsafe for the public use.
- (2) Rehabilitating the rolling stock.
- (3) Purchasing new rolling stock to replace obsolescence and take care of increasing traffic demands.
- (4) Constructing new car barns, and extending old ones to accommodate the increased capacity.
- (5) Extending lines into new districts not supplied with transportation.

property, are still under way and some of the officers of the company were retained on account of their intimate knowledge of the company's affairs.

It is generally conceded that a phenomenal amount of work has been accomplished to date. It is doubtful if street railway construction of such a varied nature, or on such a forced scale, has ever before been attempted.

Extension work has progressed rapidly on the two main car barns on Danforth Avenue and St. Clair Avenue and work was completed some weeks ago on the Howard Park extension for the double-deck buses.

Over a hundred new, modern cars have been placed on the lines and further additions, to the limit of two hundred and fifty, will soon be complete and in operation. The pay-as-you-enter cars are being equipped with motor driven air compressors and with new heating systems.

The whole of Yonge Street has been rebuilt and a considerable section on Avenue Road. Coxwell Avenue has been double tracked and extended. Bathurst street has been entirely rebuilt and extended to meet St. Clair. Front Street has been rebuilt from Yonge to George Street; also a section on Church Street. Teraulay Street has been extended northward from College to Bloor—in all, not including intersections, approximately sixteen miles of single track at widely separated parts of the city in less than three months. And it must be remembered that this is not a matter of replacing the tracks only, but of building on a solid concrete foundation.

In addition, some twenty intersections have been in-



When a street car line is to be rehabilitated, the old rails are jacked up as shown in the left hand illustration and are then cut by means of an oxy-acetylene flame into lengths convenient for hauling to the storage yard. The granite sets or paving brick are salvaged, if of value, after which the grading of the road bed is carried out by means of a steam shovel, the spoil being carried away on motor trucks.

(6) Linking up a number of outlying municipal lines with the Toronto railway system so as to make one unified system.

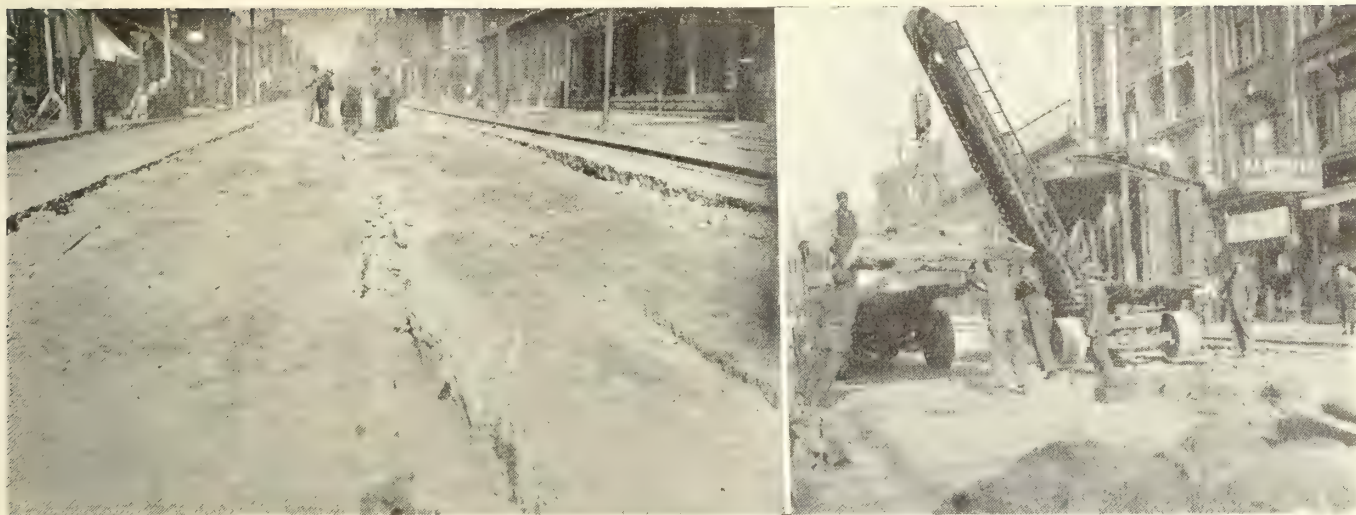
(7) Purchasing equipment for the prosecution and completion of as much as possible of this work within the space of two and a half months before winter set in and, finally,

(8) The collecting of an organization for carrying out all these details.

In connection with the item of organization, it may here be said that the Commission were handicapped to a considerable degree due to their desire to keep positions open for the staff of the Toronto Railway Company. The arbitration proceedings, looking to a proper valuation of the company's

stalled and a variety of work carried on at various points in the way of widening devil strips, straightening out or lengthening curves, installing loops, etc., to accommodate the new cars.

The work of the Toronto Commission has been of such a varied nature that we believe a complete review of it would possess unusual value and interest for our readers. For this reason the Electrical News will publish a series of articles dealing with the track work; the car barn extensions; the rolling stock; the personnel of the organization, etc. This issue deals only with certain initial features of the track work.



The picture at the left shows the condition of the roadway on Yonge Street, just south of Isabella Street, after the rails had been removed. Note the trench excavated down the centre of the devil strip dividing the base into two long slabs. The locations of the openings left by the cross ties, every 10 ft., are dimly shown. This concrete foundation broke up into 10 ft. lengths under the operation of the steam crane; these were loaded on trucks, as shown in the right hand picture.

The basic part of the rehabilitation, of course, has been the rebuilding of lines in their entirety from road bed up, old rails, ties and foundations being completely scrapped. In some streets this work has been done under traffic, in which case progress has been necessarily retarded by the interference of street cars with operations and the inability to use mechanical plant to speed up the work and keep it continuous. On those streets where traffic could be diverted, however, rapidity of operations was the main consideration, and by the aid of machinery and special labor saving ideas, tracks were rehabilitated at a speed and with an efficiency that, it is generally said, has never been excelled in connection with this type of construction. To satisfactorily follow out this program, the construction department was organized along the lines that were demonstrated to be so satisfactory during war years in building camps and erecting factories with the utmost speed. As every day's delay in opening streets for traffic badly congested the streets, overloaded those routes that carried detoured cars, and interfered with the trade and business of firms on closed thoroughfares, it was imperative that routes be reopened at the earliest possible moment.

Heavy Construction Used Throughout

Permanency and solidarity has been the aim of the Transportation Commission in its efforts, and with that object in view, the rails and track base are of a substantial type, designed to have long life under the heaviest traffic that is likely to become general in street railway service. Rails are thus 122-lb. grooved girder sections throughout, and are carried on oak or jack pine ties borne on a 9-inch concrete slab, the coarse aggregate of which is a trap rock of extreme toughness. Embedding the ties and base of rails, is another concrete slab made with softer aggregate and separated from the base slab by a layer of fine stone and dust, which is carefully tamped, with automatic tools, to bring the rails and ties to true grade. This layer means resilience. Another advantage in the double slab is that it facilitates removal of rails, should that be desirable at any time, without interfering with or destroying in any way the track foundation, which is regarded as permanent. The use of trap rock in the base adds to its toughness and permanency, while limestone in the top lift ensures easier removal of that slab if necessary. The rails are, of course, welded together for mechanical security and to give a better electrical return circuit.

This design, described above in general terms, is standard on the reconstruction work in Toronto. At intersections, however, and on certain sections of track where the bearing surface

of the sub-soil is suitable, crushed stone is being used as a base material in substitution for the concrete slab.

Special Methods Speed Up the Work

In the rehabilitation work, many practical ideas were adopted which contributed to speed and efficiency. Thus excavation of road bed was performed at a very rapid rate by steam shovel, while in concreting, a batch-transfer scheme was used, the dry mix being conveyed in specially designed batch boxes from a central source of supplies to the mixer. Old rails were jacked out of their bedding and cut with oxy-acetylene flames. At the supply yards, mechanical loaders with measuring hoppers facilitated the handling of stone and sand.

Photographs are reproduced with this article illustrating one method used in removing the old rails and the concrete foundation. On the section of the track to which these illustrations refer, the rails were laid in concrete on steel ties, 10 ft. centres. The process of removal consisted in cutting the rails with the oxy-acetylene flame into suitable lengths. The rails were then loosened by jacking up, as shown in the left hand picture of our first illustration, the steel ties coming along with them. Our second illustration, on the left, shows a section of the roadway after the rails had been removed.



Where traffic cannot be removed entirely from a street, rehabilitation operations are facilitated by the laying of a temporary track on the roadway. This illustration shows such a temporary track on a portion of Yonge Street. By this means, the renewal of the rails on both tracks may be carried out at one time without interference from traffic. In this instance, only north bound traffic is carried on the temporary track, south bound traffic being diverted to a neighboring parallel car line. In some cases it has been necessary to carry one line of traffic on the old track, in which case only one track can be renewed at a time.

The location of the rails and ties is dimly seen as, in practice, the concrete crumbled and fell back leaving a more or less level surface. The next operation was to cut a channel down the centre of the devil strip, thus dividing the old foundation into two long concrete slabs, each about 7 ft. wide. This foundation was then raised by the crane, as shown on the right of this picture, in 10 ft. sections, the breaks taking place automatically at the thin section in the concrete where the steel tie had been removed.

It is interesting to note that a quantity of these concrete slabs, some 10 ft. long by 7 ft. wide, were utilized for filling in basements--left by the removal of old houses and other buildings--on Teraulay Street, where an extension was put through. This assured a solid foundation such as would not have been obtainable with a fresh earth fill.

When a given track was selected for rehabilitation, traffic was diverted if it was possible to re-route the street cars along neighboring parallel car lines. The street was thus left free for the unobstructed progress of the reconstruction work. The one mile of double track on Yonge St. (Toronto's main thor-



An improvised steam hammer working in leads suspended from a steam shovel boom was used by the Toronto Transportation Commission as a pavement breaker. By this means the road surfacing or concrete base was broken, enabling the steam shovel to immediately follow up with the excavation.

oughfare), from Front St. to Carlton St., and a half-mile of track on Front St., from Yonge St. to George St., were reconstructed in this way, without any interference from traffic whatever. Another section of Yonge St., from Carlton to Bloor St., was also rehabilitated in the same manner, although in this case it was found possible to divert street car traffic in only one direction, the remaining traffic being carried, however, on a temporary track laid on the pavement. Vehicular traffic was, of course, entirely diverted. In some cases, for example Yonge St. from Bloor St. north for a mile, it was not possible to re-route street car traffic owing to the non-existence of parallel lines, and in such instances, one track was reconstructed at a time, the traffic normally using that track being carried on a temporary track on the pavement at the side of the street. When the first track was entirely rebuilt, the traffic was switched from the other track while it was undergoing rehabilitation. Reconstruction under traffic has been confined, with but a few exceptions, to intersections where, of course, the number of routes using them forbade diversion of all the traffic over the crossing.

Excavation by Steam Shovel

In initiating reconstruction operations the old rails were jacked up without any prior removal of the paving. As a rule, the jacking lifts the rails quite free from the ties and from the paving brick or granite setts forming the pavement in the

track allowance. The rails were then cut in convenient lengths by oxy-acetylene flames and hauled to storage yards to be later disposed of as junk. The paving brick and granite setts are collected and, in the case of the latter, re-dressed and re-used. The road bed is then excavated by means of a steam shovel, of which the commission has three, of the Marion three-quarter-yard type, one of which is mounted on caterpillar treads and the others on wheels. Where single track only is being reconstructed, the shovels mounted on wheels must be employed, as the caterpillar tread outfit is too wide for the cut. Prior to removal by the shovel, the old concrete foundation is broken up by air tools or jackhammers, the air being supplied by either an oil-driven compressor of the portable type or by a compressor car, operating on the street car tracks. The spoil is loaded by the steam shovel directly on the trucks and carried to convenient dumps. By doing the grading in a wholesale manner with the steam shovel, very rapid progress is assured and over 400 ft. a day, double track, is a general rule.

The air tools mentioned above were used in proximity to sewers. Otherwise the pavement breaker, illustrated herewith, was more rapid and effective. This is virtually a steam pile driver carried on leads suspended from the boom of a steam shovel. At first a drop hammer arrangement was employed. By means of these devices very rapid progress was made in the breaking up of pavement prior to excavation and track laying operations.

The steam pavement breaker was also utilized for breaking up the old concrete foundation slabs (after the rails and surfacing had been removed) unless the sewers were so close to the surface as to be endangered by the constant shocks.

Intersection rehabilitation is in general carried on under traffic, as it was impossible to divert all the traffic using these corners without causing tremendous congestion or delay. Work was carried on 24 hours a day, but the greatest progress was made after midnight, when the car service was more limited. Pneumatic tools were very widely used to break up the old pavement and concrete, while the excavation had necessarily to be done entirely by hand.

(To be continued)

Color Lighting

It is interesting to note that illumination is developing along varied lines. For example, the New York Section of the Illuminating Engineering Society announces an address by Rev. W. N. Guthrie on the subject "Color Psychology and its Application in Church Lighting." Mr. Guthrie has recently had installed in his church "a system of colored illumination, which has for its purpose the creating of a strong spiritual mood in connection with a symbolical service. The colors and intensities of light are constantly changed to produce an atmosphere of receptance, of calm or of stimulation. Dr. Guthrie has kindly agreed to hold a short service demonstrating the wonderful lighting effects in the church and to give his explanation of its spiritual phases, to the members and friends of the Society."

The Moncton Tramways, Electricity & Gas Co., Ltd., of Moncton, N. B., are installing two 150 kv.a., 2200 volt, 60 cycle, Canadian General Electric generators, together with two 150 h.p. Cooper gas engines. They are also building a 40 ft. by 60 ft. addition to their power house to accommodate this equipment. The estimated cost of this installation, complete, is in the neighborhood of \$45,000.

A report states that the street railway service in Muskegon, Mich., will be suspended on December 17 by order of the Public Utilities Commission unless the civic authorities eliminate jitney competition.

Current News and Notes

Antigonish, N. S.

The Antigonish Electric Company, Antigonish, N. S., has secured the contract for electrical work on a skating rink to be erected on the grounds of St. Francis Xavier College, Antigonish, at an estimated cost of \$25,000.

Brantford, Ont.

The Salisbury Electric Company, 36 Toronto St., Toronto, has secured the contract for electrical wiring on the new store of the L. R. Steele Company, Ltd., being erected at Brantford at an estimated cost of \$55,000.

Collingwood, Ont.

An agreement has been entered upon by the Municipal Council of Collingwood whereby the electric furnace plant of that town will be operated. By the terms of the agreement, William T. Stevens is to operate the electric metallurgical smelter formerly owned by the Kennedy Co., and later purchased by the Baldwin Canadian Steel Company, and now owned by the town.

Cap de la Madeleine, Que.

Mr. N. Montplaisir, Cap de la Madeleine, Que., has been awarded the contract for electrical work on a new fire station being erected at that place.

Dixie, Que.

Mr. Jos. Bellefeuille, St. Joseph St., Lachine, Que., has secured the contract for electrical work on 16 residences to be erected at Dixie, Que., by the Dixie Land Housing Company, Montreal, at an estimated cost of \$100,000.

Halifax, N. S.

At the regular monthly meeting of the Electrical Association of Nova Scotia, held in Halifax on Monday evening, November 21, Mr. J. R. Spence of the Canadian General Electric Company, gave an illustrated address on incandescent lighting development, from its inception up to the present day.

Hamilton, Ont.

The flat rate for water heaters suggested by the Ontario Hydro commission is being adopted by the Hamilton Hydro commission. The rate will be \$1.75 per month for a continuous 500-watt current. The 1000 and 2000-watt coils will register on the meter.

For the ten months ending October 31, 1921, the Hydro-electric System of Hamilton, Ont., shows a revenue of \$100,466.21 as compared with \$95,980.79 for the first ten months of 1920, an increase of \$4,485.92. In domestic lighting the increase was \$5,011.43, in commercial lighting \$1,132.21, and in street lighting \$119.73, while in power there was a decrease of \$1,777.44. The gross profits are reported as \$14,476.43 as compared with \$19,225.54 for 1920. This decrease is accounted for largely by a one dollar per horsepower increase in power purchased, this item alone amounting to \$2,400, and to a \$2,750 charge made against depreciation, this being for new transformers installed at the North Water Street sub-station. The greater demand for power due to the increased use of electrical appliances and ranges had necessitated an increase in the amount of power purchased. Since the beginning of last May more than two hundred electric ranges had been installed.

Montreal, Que.

Mr. H. R. Cassidy, 255 Regent Ave., Montreal, has been awarded the contract for electrical work on a warehouse

recently erected at 32-34 Bonaventure St., Montreal, for Messrs. J. R. Chogg & Sons, 28 Bonaventure St.

Moncton, N. B.

Mr. J. N. McDonald, 72 George St., Moncton, N. B., has been awarded the contract for electrical work on a tenement building being erected on West St., Moncton, for Mr. A. Fownes of that place.

Oakville, Ont.

At a recent meeting of the town council of Oakville, Ont., a resolution was unanimously passed to the effect that the council protested against the refusal of the Provincial government to sanction the building of hydro-radials.

Ottawa, Ont.

Mr. P. Ackroyd, 416 Bank St., Ottawa, Ont., has been awarded the contract for electrical work on an addition recently built to the Holiness Movement church at Fifth Ave. & Monk St., Ottawa.

The Canada Gazette of November 26 announces that supplementary letters patent have been issued, amending those issued previously incorporating the Manitoba Power Company, Ltd., which cancels the following clause: "The capital stock of the company shall be five million dollars, divided into fifty thousand shares of one hundred dollars each," and substituting therefor the following: "The capital stock of the company shall consist of one hundred thousand common shares without nominal or par value, which shall be issued and allotted for the sum of ten dollars each, provided that the said company shall carry on its business with a capital stock of one million dollars."

Outremont, Que.

Mr. E. Hodge, 328 Rachel St., Outremont, Que., has secured the electrical contract on a \$50,000 apartment house recently erected on Querbes Ave., Outremont, for Mr. H. Dansereau, 1166 St. Hubert St.

Regina, Sask.

The operating figures of the electric light plant of the city of Regina, Sask., for the ten months ending October 31, 1921, show a surplus of approximately \$40,000. This is very favorable compared with those of last year, which showed a \$60,000 deficit.

Commissioner Thornton, of Regina, Sask., makes the following statement in connection with the one-man cars operated by the Regina Street Railway System: "We have saved over \$20,000 in the last part of this year as a direct result of the one-man street car, and our observations are that the cars are just as comfortable as before; we have run into no serious operating conditions, and in every way they have proved satisfactory to the operating staff and to the public."

St. Laurent, Que.

Mr. E. Hodge, 328 Rachel St., Montreal, has been awarded the contract for electrical work on a new school being erected at St. Laurent, Que.

Toronto, Ont.

The Ontario Gazette announces the incorporation of the Burgess Electrical Company, Ltd. for the purpose of conducting an electrical school, preparing and selling courses in electrical and other engineering subjects; also to carry on the business of electrical consulting engineers and electrical contractors. The new firm is capitalized at \$40,000. Head office: Toronto.

POSITION WANTED—Electrical Engineer, technical and commercial training, over twenty years' practical experience with large power and industrial companies in operation, construction and maintenance of hydro-electric plants, sub-stations, transmission lines, distributing systems and motor installations, desires position with power or industrial company. Present position electrical engineer-manager of Street Railway, and Light and Power System. Excellent reasons for desiring change. Box 652, Electrical News, Toronto. 17-1f

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Railways Placing Orders for New Equipment

The Chicago, Burlington & Quincy R.R. and the Colorado & Southern Ry. Co. have been authorized to purchase \$15,000,000 worth of new rolling stock, and it is understood that immediate arrangement is to be made for the purchase of 7,300 freight cars, 55 heavy freight and passenger locomotives and 127 all-steel passenger cars. This decision was made on the "belief that there is a decided upward tendency in traffic and that before long additional facilities will be required to meet the transportation demands of the country."

A report has been made also that the Illinois Central R.R. Co. has placed orders for 900 cars at an aggregate cost of \$2,660,000, and has invited bids for 2,000 coal cars to cost \$4,000,000.

FIELD FOR ORNAMENTAL CONCRETE UNLIMITED

The natural characteristics of concrete render it highly adaptable to the manufacture of ornamental concrete products and to the reproduction of decorative exterior and interior designs. Its extreme plasticity and the development of glue and plaster molds make it possible to faithfully reproduce intricate and complicated architectural features. Use of special facing aggregates, white cement and coloring materials furnishes any desired surface color or texture. Properly made concrete is durable and is unaffected by atmospheric conditions.

Combined with these advantages is its obvious economy, for an indefinite number of replicas can be cast from a single mold. Ornamental pre-cast concrete trimstone has a decorative value as great as carved natural stone at a much lower cost.

Even though concrete possesses these great advantages, its use as a decorative material is almost entirely undeveloped. Ignorance of its possibilities and a lack of understanding of the proper methods of manufacture have retarded its growth. Fortunately, knowledge of this material is now being disseminated through numerous channels. One of the most important of these is a system of education furnished by the Art Stone Co., Waynesboro, Pa. This takes the form of a comprehensive book dealing in a very thorough and easily understandable manner with the correct methods of manufacturing ornamental concrete products and containing many valuable formulas and confidential trade notes. In addition to selling this book, the Art Stone Co. offers expert aid and instruction to its patrons by correspondence. The "Artisto" system promises to do as much toward the development of the concrete industry as the Bessemer discoveries did for the iron and steel industry.

With a thorough knowledge of ornamental concrete, the manufacturer of concrete products has an almost virgin field, unlimited in its possibilities, before him.

Chicago City Drawbridges

Fifty movable highway bridges are maintained by the city of Chicago, the different types being as follows: 24 trunnion bascule bridges, 12 centre bearing swing bridges, 12 rolling lift bascule bridges, one vertical lift bridge and one pontoon bridge. Of the trunnion bascule bridges, 22 are of the type developed by the city and the others are of the Strauss and Page & Schnable types. The pontoon bridge is across the Calumet River at Torrence Ave.

Harbor to be Deepened

The London & North-Western Railway Company have contracted with the Tilbury Contracting & Dredging Company, Limited, of Westminster, England, for the deepening of the harbor at Holyhead. This work, in addition to a large amount of ordinary dredging, comprises the removal of nearly 200,000 tons of rock, on which the most up-to-date type of rock-cutting plant will be used.

About 20 miles east of Pueblo, Colo., across the Huerfano River is being built for the Colorado State Highway Department, one of the largest concrete bridges in the state. The bridge is of concrete arches, five 80-ft. spans. It is being built by the Pueblo Bridge & Construction Co.

35 Per Cent. Gain in Asphaltic Pavement Yardage

Reports from U. S. city engineers to the Asphalt Association, New York, show that over 30,000,000 square yards, or 1,750 miles of asphaltic pavement, 30 ft. wide, will be laid on city streets this year. Reports from state highway departments indicate that 23,000,000 sq. yd. will be laid on the state highways, while the area laid in counties and other districts will bring the total to 65,000,000 sq. yd., or 3,690 miles of asphalt pavements 30 ft. wide. This will be an increase of 35 per cent. over the yardage in 1920.

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3 h.p., 3 ph., 25 cyl., 550 volts, 1450 r.p.m.
2 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
2 h.p., 3 ph., 25 cyl., 550 volts, 1440 r.p.m.
2 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
1 h.p., 1 ph., 60 cyl., 110 volts, 1750 r.p.m.
1 h.p., 3 ph., 25 cyl., 550 volts, 1500 r.p.m.
1 h.p., 3 ph., 25 cyl., 550 volts, 710 r.p.m.
¾ h.p., 1 ph., 60 cyl., 110 volts, 1700 r.p.m.
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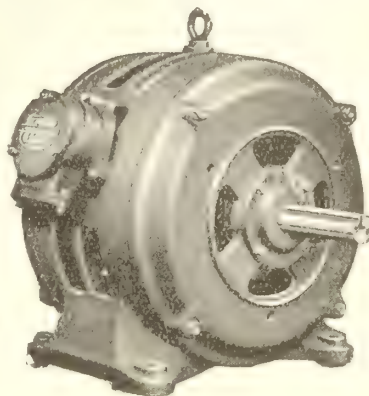
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 - 1 13 hp. Lancash. 750 rev., starter, rails, pulley.
 - 1 7½ hp. Fairbanks 750 rev., starter, rails, pulley.
- 60 CYCLE, 2 PHASE, 220 VOLTS, SECOND HAND
- 1 20 hp. T.H.E. 1200 rev., pulley rails starter.
 - 1 20 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 2 10 hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Westgh. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. Ful. Wen. 1200 rev., pulley, rails, starter.
 - 1 7½ hp. T.H.E.Co. 1800 rev., pulley, rails, starter.
- 60 CYCLE, 3 PHASE, 220 VOLTS, SECOND HAND
- 1 7½ hp. All Chal. 1200 rev., pulley rails, starter.
 - 1 15 hp. C. Wheeler 1800 rev., pulley, rails, starter.
- 60 CYCLE, 1 PHASE, 110 VOLTS, SECOND HAND
- 3 ½ hp. 1200 rev. clutch type T.H.E.
 - 1 1 hp. 1800 rev. split phase Peerless.
- 1 Electric hoist 550 volt, 25 cycle, 3 phase, 1000 lbs. capacity. New
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 - 3 1 hp. Peerless, 110/220 volt, 25 cycle, 1800 rev.
 - 3 1 hp. Wagner, 110/220 volt, 25 cycle, 1800 rev.
 - 7 ½ hp. Peerless, 110/220 volt, 25 cycle, 1800 rev.
 - 5 ½ hp. Wagner, 110/220 volt, 25 cycle, 1800 rev.
 - 1 1 hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
 - 1 1 hp. Westinghouse, 110/220 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Wagner, 110/220 volt, 60 cycle, 1800 rev.
- SPLIT PHASE**
- 2 1 hp. St Louis 110 volt, 60 cycle, 1800 rev.
 - 2 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Menominee 110 volt, 60 cycle, 1800 rev.
 - 4 ½ hp. Ohio 110 volt, 60 cycle, 1800 rev.
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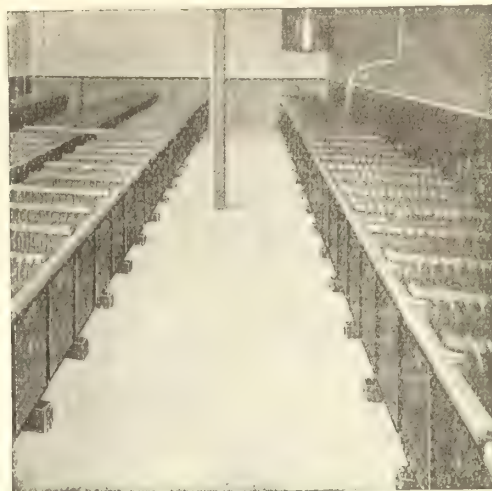
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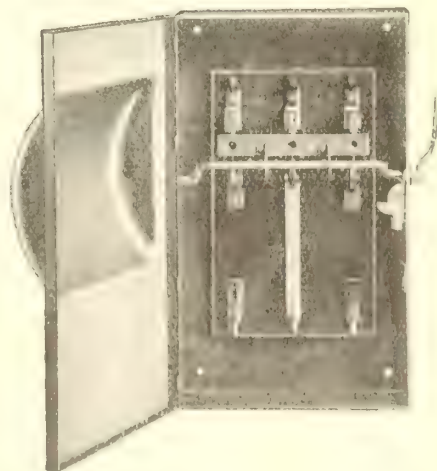
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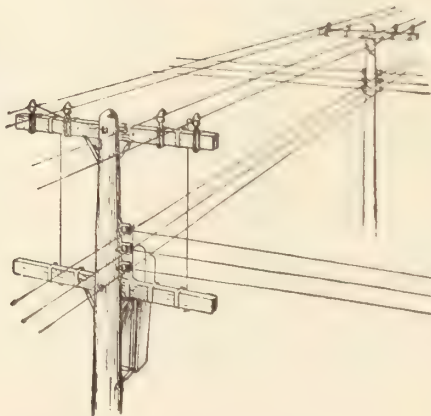
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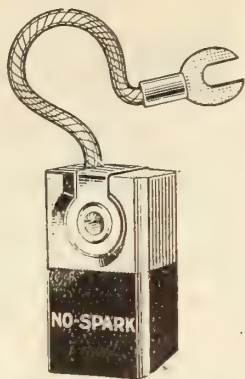
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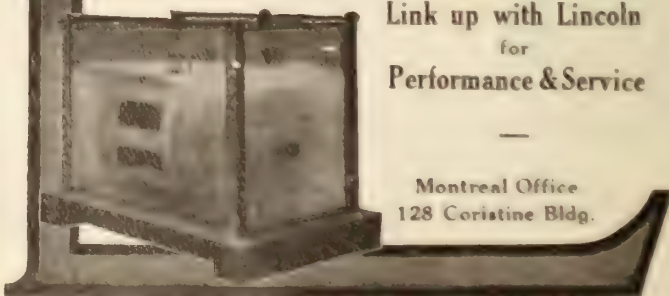
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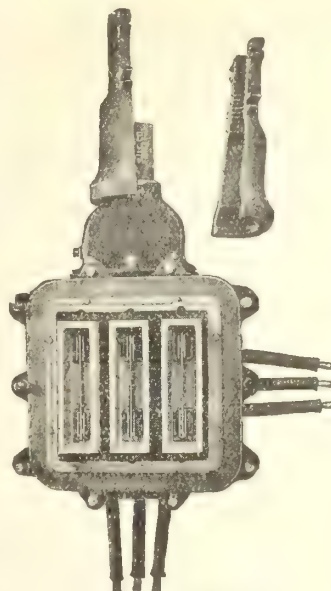
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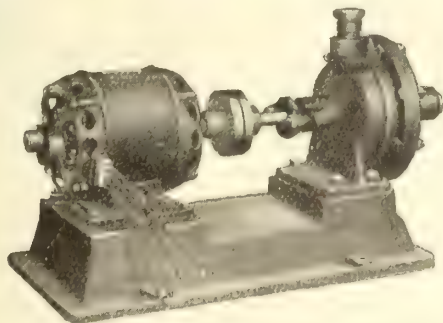
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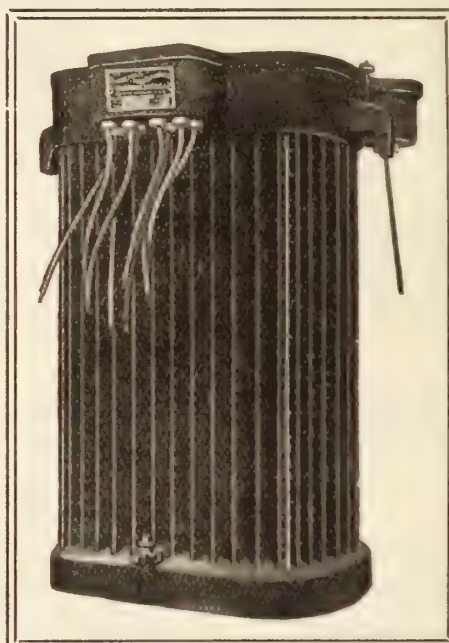
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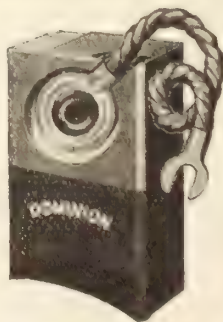
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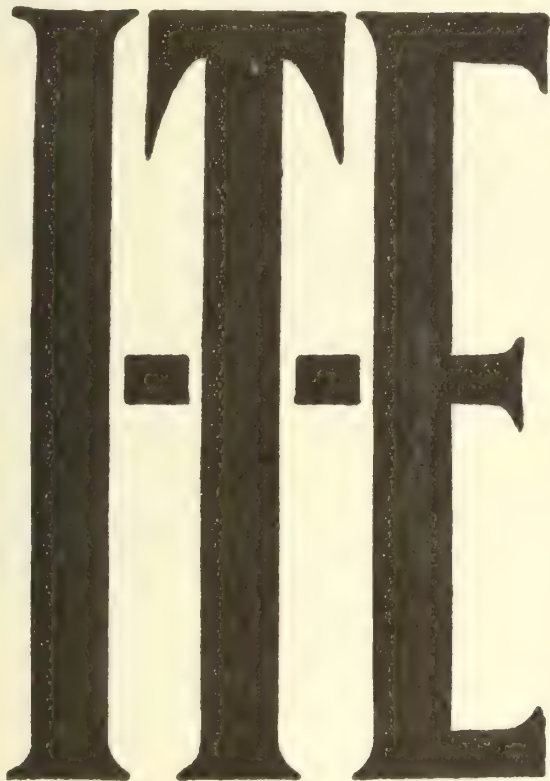
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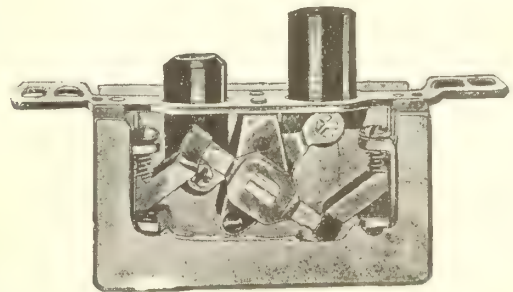
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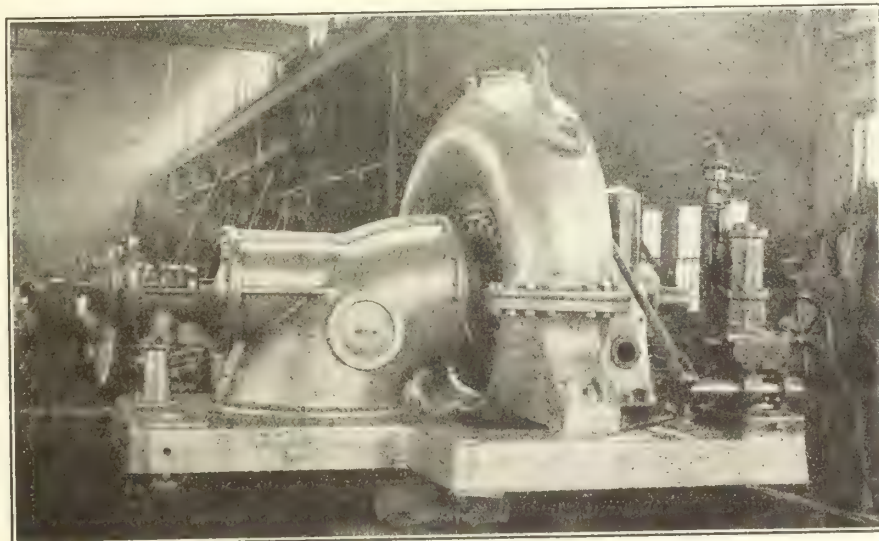
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Baudot Printing Telegraph System, by H. W. Pendry. Published in 1913 by Whittaker & Company. 144 pages, illustrated. Price \$2.50.

Direct-Acting Steam Pumps, by Frank F. Nickel. Published in 1915 by McGraw-Hill Book Company. 258 pages, illustrated. Price \$2.50.

Direct Current Machinery, Theory and Operation of, by Cyril M. Jansky, B.S., B.A., 1st edition, published in 1917 by McGraw-Hill Co., Inc. 285 pages, illustrated. Price \$2.50.

Dynamo-Electric Machinery, by Francis B. Crocker, E. M., Ph.D. Published in 1908 by American School of Correspondence. 236 pages, illustrated. Price 50c.

Electric Railway, by A. Morris Buck, M.E. Published in 1915 by McGraw-Hill Book Company, Inc. 390 pages, illustrated.

"Electrical Rates" - by G. P. Watkins, Ph. D., - recently published by D. Van Nostrand Company, 228 pages, price \$3.00.

"Engineering Electricity," by Ralph G. Hudson, S.B., 190 pages illustrated. Published in 1920 by the John Wiley & Sons, Incorporated. Price \$2.00.

Examples in Alternating-Currents, (Vol. 1), by F. E. Austin, B.S. Published in 1915. 223 pages, illustrated. Price \$1.50.

Handbook of Machine Shop Electricity, by C. E. Clewell. Published in 1916 by McGraw-Hill Book Company. 461 pages, illustrated. Price \$3.00.

"How to Sell Electrical Labor-Saving Appliances," by Electrical Merchandising, first edition, 115 pages, illustrated. Published in 1918 by McGraw-Hill Book Company, Inc. Price \$1.00.

Practical Electric Illumination, by Terrell Croft. First edition, published in 1917 by the McGraw-Hill Book Co. 225 pages, illustrated. Price \$2.00.

Principles of Alternating Current Machinery, by Ralph R. Lawrence. Published in 1916 by McGraw-Hill Book Company. 614 pages, illustrated. Price \$4.50.

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Radiodynamics—The Wireless Control of Torpedoes and Other Mechanisms, by B. F. Miessner. Published in 1916 by D. Van Nostrand Company. 206 pages, 112 illustrations. Price \$2.00.

Radiation, Light and Illumination, by Steinmetz. Published in 1909 by McGraw-Hill Book Company. 304 pages, illustrated. Price \$2.00.

"Storage Batteries," by C. J. Hawkes, 157 pages, illustrated. Published in 1920 by The Wm. Hood Dunwoody Industrial Institute. Price \$2.00.

Telegraph Practice, a Study of Comparative Method, by John Lee, M.A. Published in 1917 by Longmans-Greene & Co. 102 pages. Price \$1.00.

Telegraphy—A Detailed Exposition of the Telegraph System of the British Post Office, by T. E. Herbert, A.M. Inst. E.E. Third edition. Published in 1916 by Whittaker & Company. 985 pages, 630 illustrations. Price \$2.00.

"Theory and Calculation of Transient Electric Phenomena and Oscillations," by Charles Proteus Steinmetz. Third edition, revised and enlarged. Published in 1920 by McGraw-Hill Book Co., Incorporated. 696 pages, illustrated. Price \$6.00.

The Dynamo (2 volume), by Hawkins & Wallis. Published in 1909 by Whittaker & Company. Price \$4.00.

The School of Practical Electricity (Electrician's Course in 2 volumes. Volume 1. Published by Electroforce Publishing Company, Milwaukee, Wis. 410 pages, illustrated. Price \$4.50.

The Practical Railway Spiral, by L. C. Jordan, C.E. Published in 1913 by Van Nostrand Company. 155 pages. Price 50c.

ELECTRICAL NEWS,

347 Adelaide St. W., Toronto, Ontario

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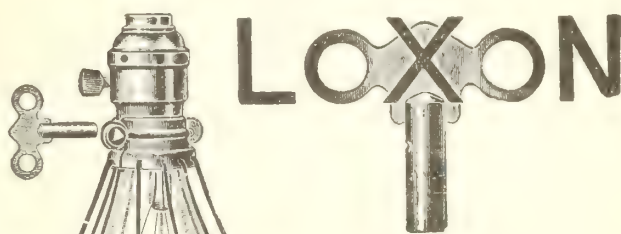
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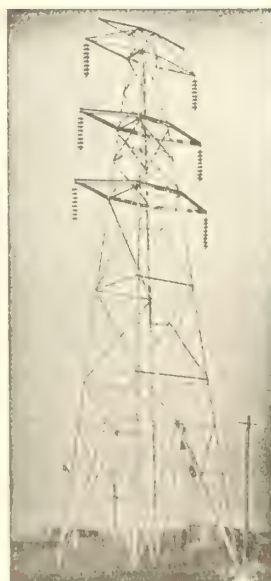
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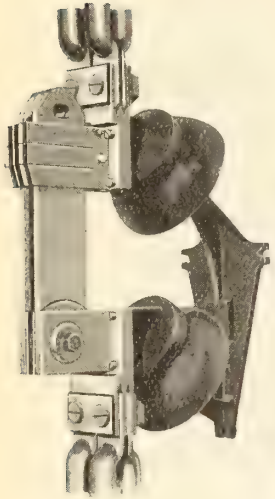
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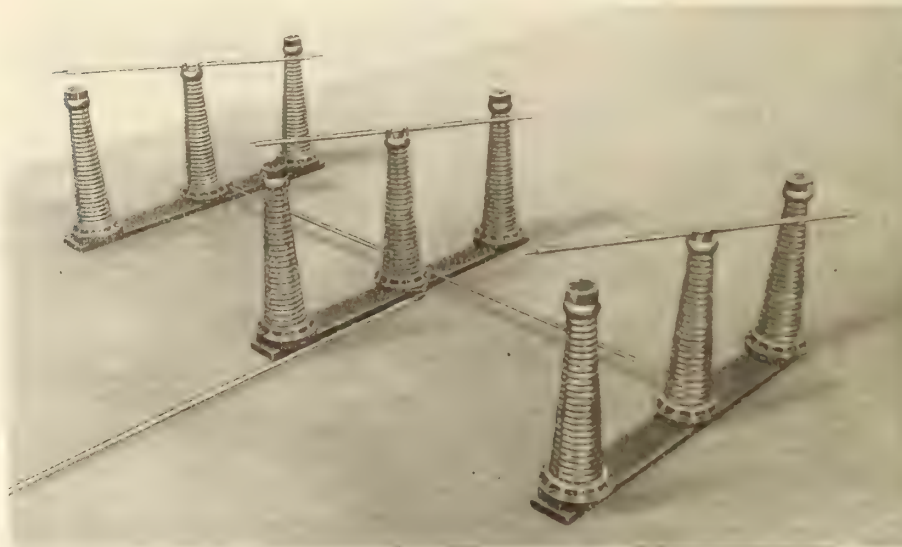


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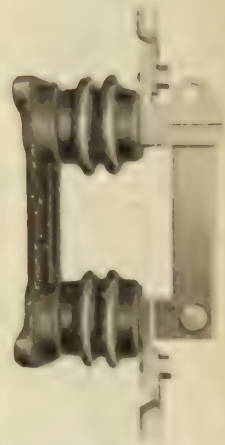
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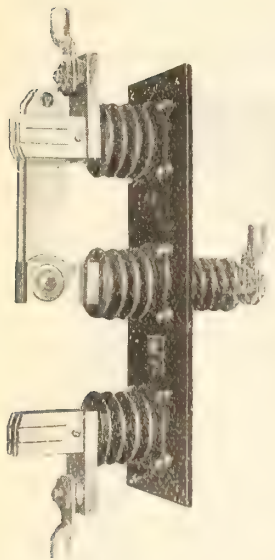
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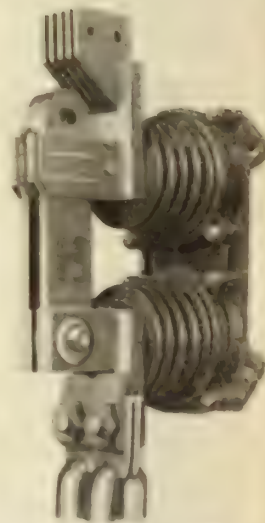


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switch, showing operation
hook stick for
operation on the break
jaw



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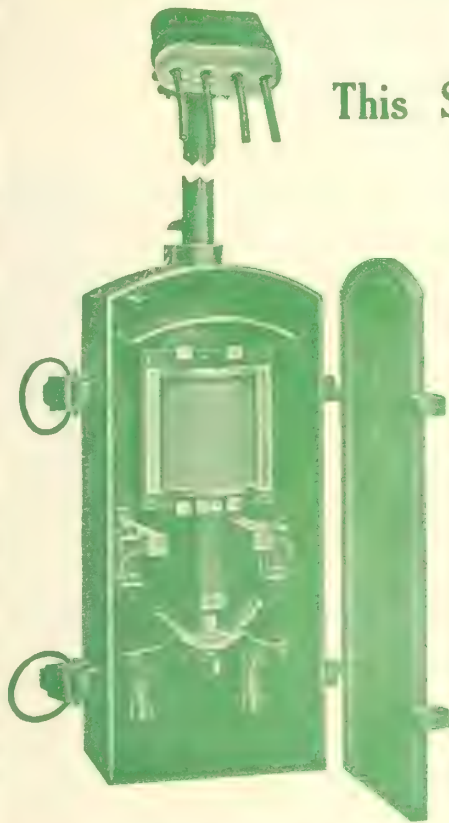
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